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February 2001

2000 Wastewater Land Application Site Performance Reports for the Idaho National Engineering and Environmental Laboratory

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Central Facilities Area Sewage Treatment Plant
Idaho Nuclear Technology and Engineering Center Sewage Treatment Plant
Idaho Nuclear Technology and Engineering Center Percolation Ponds
Test Area North/Technical Support Facility Sewage Treatment Plant

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Idaho National Engineering and Environmental Laboratory
Bechtel BWXT Idaho, LLC
Idaho Falls, Idaho 83415

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SUMMARY

The *2000 Wastewater Land Application Site Performance Reports for the Idaho National Engineering and Environmental Laboratory* (INEEL) describe site conditions for the following facilities as required by the applicable State of Idaho Wastewater Land Application Permits (WLAPs):

- Central Facilities Area (CFA) Sewage Treatment Plant (STP), Permit Number LA-000141-01
- Idaho Nuclear Technology and Engineering Center (INTEC) (formerly the Idaho Chemical Processing Plant or ICPP) STP, Permit Number LA-000115-02
- INTEC Percolation Ponds, Permit Number LA-000130-02
- Test Area North/Technical Support Facility (TAN/TSF) STP, Permit Number LA-000153-01.

These reports contain the following information:

- Site description
- Facility and system description
- Status of special compliance conditions
- Permit-required monitoring data
- Discussions of environmental impacts by the facilities
- Special studies.

The CFA report covers from December 1, 1999, through November 30, 2000, while the INTEC and TAN reports cover from November 1, 1999, through October 31, 2000. Reporting periods are based on the individual facility permits.

The original WLAP issued for the CFA STP expired August 7, 1999. A renewal application was submitted February 9, 1999, and a letter authorizing the continued operation of the CFA STP under the original WLAP was issued by the Idaho Division of Environmental Quality on September 18, 2000. The original WLAPs issued for the INTEC STP and the INTEC Percolation Ponds expired September 17, 2000. Renewal applications for these two WLAPs were submitted during March 2000. Authorization to continue to operate the existing Percolation Ponds was received in June 2000, but was not received for the STP before the end of the permit year. The original WLAP issued for TAN STP will expire in May 2001. The renewal application for this facility is planned for submittal during the 2001 permit year.

At CFA, approximately 10.7 million gallons of treated wastewater was land applied in the irrigation area. Soil and weather conditions combined with the relatively low volume of wastewater applied during permit year 2000 resulted

in no leaching loss for the year, compared to the permit limit of 3 in. per year. Soil sampling in the application area showed a slight increase in sodium adsorption ration above the preapplication level in the upper soil horizon and elevated levels when compared to the nonirrigated areas adjacent to the application area. No impact to breeding bird species was evident during the 2000 permit year.

Evaluations conducted to date on the nitrate + nitrite concentrations detected in the groundwater near the CFA STP have determined that the new STP is not the most likely source.

The INTEC Percolation Ponds annual flow volumes and contaminant concentrations in the groundwater remained within permit limits during the 2000 reporting period. As in previous years, concentrations of total dissolved solids (TDS) were in compliance with permit limits, but at elevated concentrations in the compliance wells when compared to the background wells. The elevated concentrations are primarily attributed to the concentrations in the effluent from the water softening and treatment operations in CPP-606. No trends are evident for TDS at either of the compliance wells.

The INTEC STP effluent flow volumes, effluent total suspended solids (TSS), and groundwater concentrations were all within permit limits. Monthly total nitrogen concentrations in the effluent exceeded the permit limit (20.0 mg/L) three times during the 2000 permit year. However, the yearly average total nitrogen concentration decreased from the 1999 yearly average. Maintenance and operational corrective actions continued, and evaluations of their effectiveness in reducing nitrogen concentrations are ongoing.

Chloride, total Kjeldahl nitrogen (TKN), TDS, nitrate, ammonia, and total phosphorus concentrations were elevated in the perched water well at the INTEC STP compared to background concentrations in the aquifer. The same constituents were within permit limits in the aquifer and only slightly elevated or indistinguishable from background when measured at the compliance well, suggesting that the STP impacts on groundwater were negligible.

The TAN/TSF effluent flow volumes and concentrations were within permit limits. Groundwater iron concentrations exceeded permit limits in April and October. Corrosion in the riser pipes in the wells is the probable cause of the elevated iron concentration. TDS, zinc, and lead groundwater concentrations exceeded permit limits in at least one compliance well in October. The corrosion in the riser pipes is also a possible cause of the elevated TDS and zinc concentrations. While lead concentrations in one compliance well exceeded the permit limit in October, no increasing trend is evident in the effluent lead concentrations, nor have concentrations in the other downgradient wells increased. Total coliform was absent in the 2000 sampling except in an upgradient well in a form that is found in natural water bodies and soils. Overall, environmental impacts are considered negligible.

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ACRONYMS

BBWI	Bechtel BWXT Idaho, LLC
BOD	biochemical oxygen demand
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CES	Cascade Earth Sciences, Ltd.
CFA	Central Facilities Area
CFR	Code of Federal Regulations
COD	chemical oxygen demand
DOE-ID	Department of Energy Idaho Operations Office
EBR-I	Experimental Breeder Reactor I
EC	electrical conductivity
EPA	Environmental Protection Agency
ESRF	Environmental Science and Research Foundation
ESRP	Eastern Snake River Plain
FFA/CO	Federal Facilities Agreement/Consent Order
gpd	gallons per day
ICPP	Idaho Chemical Processing Plant
IDEQ	Idaho Division of Environmental Quality
in.	inch or inches
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
LMITCO	Lockheed Martin Idaho Technologies Company
MAC	maximum allowable concentration
MG	million gallons
mi	miles
N	nitrogen
NNN	nitrate + nitrite as nitrogen
NO_2N	nitrite as nitrogen
NO_3N	nitrate as nitrogen
NH_3N	ammonia as nitrogen
NH_4N	ammonium
P	phosphorus
PCS	primary constituent standards
RE	removal efficiency
RI	rapid infiltration
RWMC	Radioactive Waste Management Complex

SAR	sodium adsorption ratio
SCS	secondary constituent standards
SMCL	secondary maximum contaminant level
SRPA	Snake River Plain Aquifer
STP	Sewage Treatment Plant
TAN	Test Area North
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TSF	Technical Support Facility
TSS	total suspended solids
USGS	United States Geological Survey
WAG	Waste Area Group
WLAP	Wastewater Land Application Permit

2000 Wastewater Land Application Site Performance Reports for the Idaho National Engineering and Environmental Laboratory

1. INTRODUCTION

The *2000 Wastewater Land Application Site Performance Reports for the Idaho National Engineering and Environmental Laboratory* (INEEL) describe site conditions for the facilities listed in Table 1-1 as required by the State of Idaho Wastewater Land Application Permits (WLAPs).

Table 1-1. Idaho National Engineering and Environmental Laboratory facilities and permit numbers.

Facility	Permit Number
Central Facilities Area (CFA) Sewage Treatment Plant (STP)	LA-000141-01
Idaho Nuclear Technology and Engineering Center (INTEC) (formerly the Idaho Chemical Processing Plant or ICPP) STP	LA-000115-02
INTEC Percolation Ponds	LA-000130-02
Test Area North/Technical Support Facility (TAN/TSF) STP	LA-000153-01

These reports contain the following information:

- Site description
- Facility and system description
- Status of special compliance conditions
- Permit-required monitoring data
- Discussions of environmental impacts by the facilities
- Special studies.

The CFA report covers from December 1, 1999, through November 30, 2000, while the INTEC and TAN/TSF reports cover from November 1, 1999, through October 31, 2000. Reporting periods are based on the individual facility permits.

The original WLAP issued for the CFA STP expired August 7, 1999 (IDEQ 1994). A renewal application was submitted February 9, 1999 (DOE-ID 1999a), and a letter authorizing the continued operation of the CFA STP under the original WLAP was issued September 18, 2000 (IDEQ 2000a). The original WLAPs issued for the INTEC STP (IDEQ 1995a) and the INTEC Percolation Ponds (IDEQ 1995b) expired September 17, 2000. Renewal applications for these two WLAPs were submitted during March 2000 (BBWI 2000a and BBWI 2000b). Authorization to continue operation was received in June 2000 for the existing INTEC Percolation Ponds (IDEQ 2000b). At the close of the permit year, authorization to continue operation had not been received for the INTEC STP. The original WLAP issued for the TAN STP will expire in May 2001 (IDEQ 1996), and the renewal application is planned for submittal during the 2001 permit year.

Operations at all facilities are conducted by Bechtel BWXT Idaho, LLC (BBWI) for the Department of Energy Idaho Operations Office (DOE-ID).

1.1 Idaho National Engineering and Environmental Laboratory Site Description

The INEEL, approximately 890 mi^2 in size, is located on the Eastern Snake River Plain (ESRP) in southeastern Idaho (Figure 1-1). It was established as a nuclear energy research and development testing station in the late 1940s and was designated a National Environmental Research Park in 1975. All land within the INEEL is protected as an outdoor laboratory where the effects of energy development and industrial activities on the environment and the complex ecological relationships of this cool desert ecosystem can be studied. The INEEL serves as a research area for scientists from several universities and state and federal agencies.

Subsurface geology at the INEEL consists of successive layers of basalt and sedimentary strata, overlaid at the surface by wind- and water-deposited sediments. The primary groundwater source of the region is the Snake River Plain Aquifer (SRPA). Most of the INEEL is located in the Mud Lake-Lost River Basin (Pioneer Basin), which is an informally named, closed drainage basin. Surface water within the Pioneer Basin includes that from the Big Lost River, the Little Lost River, and Birch Creek, all of which drain mountain watersheds located to the north and northwest of the INEEL. All three water bodies may flow onto the INEEL during high flow years, but are otherwise intermittent. In addition, local rainfall and snowmelt contribute to surface water mainly during the spring. The portion of surface water that is not lost to evapotranspiration infiltrates into the subsurface. Both aquifer and surface waters are used for irrigating crops and other applications outside the INEEL.

The SRPA is approximately 199 mi long and 20 to 60 mi wide and encompasses an area of about 9,650 mi^2. The depth to the SRPA varies from 200 ft in the northeastern corner of the INEEL to 886 ft in the southeastern corner. The aquifer is approximately 250 ft thick (Robertson 1974). The SRPA is the ESRP's source of groundwater. It is also the source of process water and drinking water for both on and off the INEEL. The SRPA may contain as much as 2×10^9 acre-ft of water. Approximately 6.5×10^6 acre-ft of water is used for irrigation upgradient of the Hagerman area. Aquifer recharge occurs from infiltration of irrigation water (1.5×10^6 acre-ft), river seepage (1.3×10^6 acre-ft), and infiltration of precipitation (0.6×10^6 acre-ft) (Lewis and Jensen 1984). Groundwater in the SRPA flows generally to the southwest, although locally the direction of flow is influenced by recharge from rivers, surface water spreading areas, and heterogeneities in the aquifer. Tracer studies at the INEEL indicate that natural flow rates range from 5 to 20 ft/d. Aquifer transmissivities range from 3×10^4 to 1.8×10^7 gal/d/ft; storage coefficients range from 0.01 to 0.06 (Robertson et al. 1974).

Meteorological and climatological data that apply to the INEEL region are collected and compiled from several meteorological stations operated by the National Oceanic and Atmospheric Administration field office in Idaho Falls, Idaho. Three stations are located on the INEEL at CFA, TAN, and the Radioactive Waste Management Complex (RWMC). Annual rainfall at the INEEL is light, and the region is classified as arid to semiarid (Clawson et al. 1989). The long-term average annual precipitation at the INEEL is 8.7 in. Monthly precipitation is usually highest in April, May, and June and lowest in July. The average summer daytime maximum temperature is 83°F, while the average winter daytime

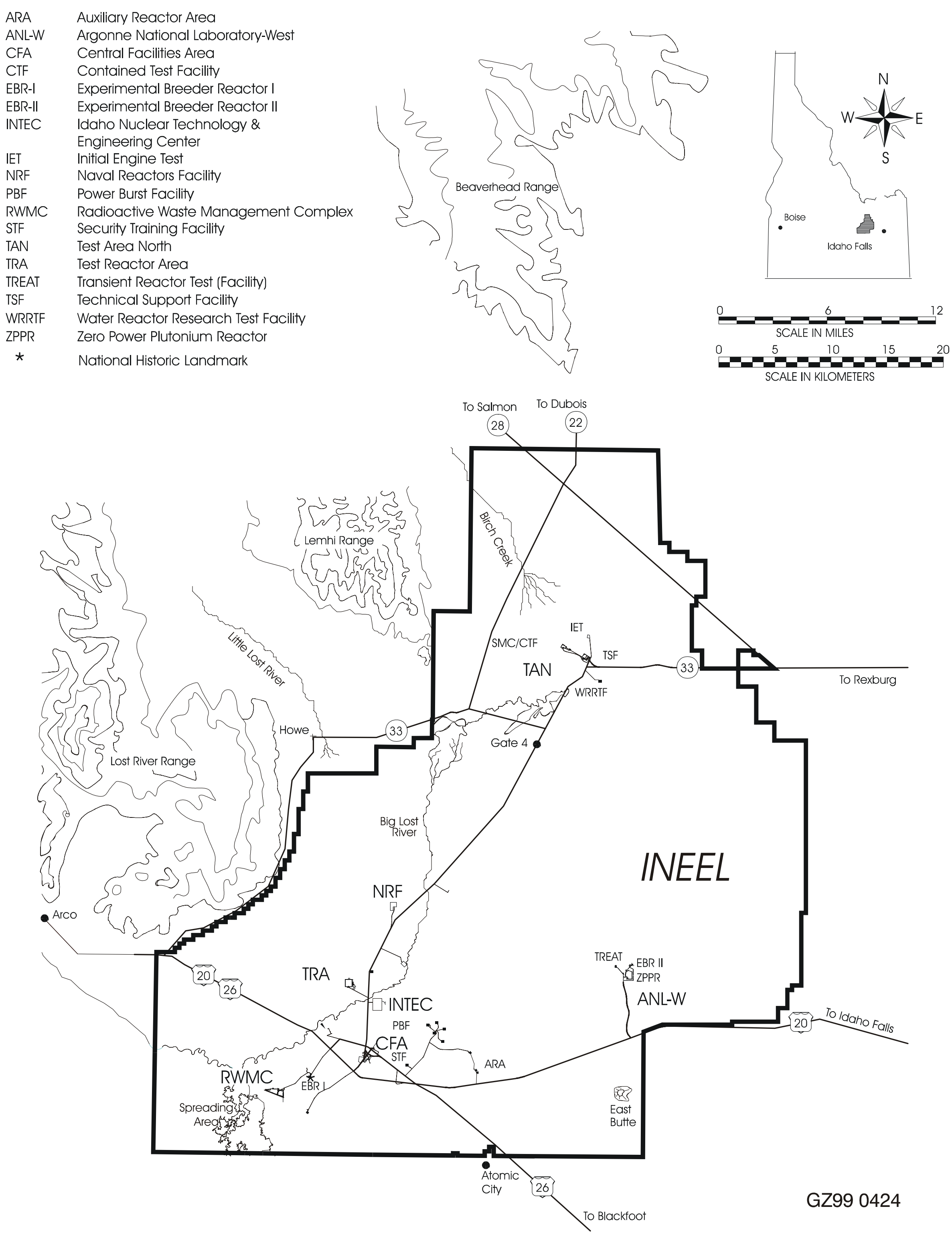

Figure 1-1. Idaho National Engineering and Environmental Laboratory.

maximum temperature is 31°F. (Clawson et al. 1989). The INEEL is in the belt of prevailing westerly winds, which are channeled within the plain to produce a west-southwesterly or southwesterly wind approximately 40% of the time.

1.2 Liquid Effluent Monitoring Program

The INEEL Liquid Effluent Monitoring Program monitors effluent discharges at facilities operated by Bechtel BWXT Idaho, LLC (BBWI) at the INEEL. This program involves sampling, analysis, and data interpretation carried out under a quality assurance program. This program conducted effluent and influent monitoring as required by the Wastewater Land Application Permits (WLAPs) for the CFA STP, the INTEC STP, and the TAN/TSF STP during the 2000 reporting period. INTEC Operations monitored effluent to the INTEC Percolation Ponds. Sampling procedures were followed to collect effluent samples each month according to a randomly generated sampling schedule.

Effluent analyses were conducted using methods described in 40 Code of Federal Regulations (CFR) 136, (40 CFR 136), with the exception of the INTEC Percolation Pond effluent samples in which anions were analyzed using Environmental Protection Agency (EPA) Method 300.0 (EPA 1984) approved for drinking water.

1.3 Groundwater Monitoring Program

Groundwater was monitored in support of the WLAPs for the INTEC Percolation Ponds, the INTEC STP, and the TAN/TSF STP following the sampling and analysis plan and approved procedures. All samples were collected in April and October at INTEC and TAN facilities. All samples were analyzed using EPA-approved methods.

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2. CENTRAL FACILITIES AREA SEWAGE TREATMENT PLANT DATA SUMMARY AND ASSESSMENT

2.1 Site Description

The Central Facilities Area is located about 50 mi west of Idaho Falls, Idaho, in Butte County Idaho, approximately 5 mi from the INEEL southern boundary. The CFA facilities provide functional space for crafts, offices, services, and laboratories for approximately 1,100 employees. CFA includes approximately 72 buildings and 62 other structures.

The CFA STP serves all major facilities at CFA. The STP is southeast of the CFA area, approximately 2,200 ft downgradient of the nearest drinking water well (Figure 2-1). A public road passes approximately 0.75 mi south of the STP, and the nearest inhabited building is approximately 2,000 ft from the wastewater land application area.

2.2 System Description and Operation

The CFA STP was built in 1994 and put into service on February 6, 1995. Approximately 110,000 gallons per day (gpd) of water were processed from sanitary sewage drains throughout CFA during permit year 2000. Wastewater is derived from restrooms, showers, and the cafeteria, a significant portion of which is comprised of noncontact cooling water from air conditioners and heating systems. This large volume of cooling water dilutes and weakens the wastewater effluent. Other contributing discharge sources include those from bus and vehicle maintenance areas, analytical laboratories, and a medical dispensary.

The STP consists of:

- 1-acre partial-mix, aerated lagoon (Lagoon No. 1)
- 9-acre facultative lagoon (Lagoon No. 2)
- 0.5-acre polishing pond (Lagoon No. 3)
- Sprinkler pivot irrigation system, which applies wastewater on up to 73.5 acres of native desert range land.

Under existing flow conditions, the winter storage capacity of the lagoons or ponds has been at least 8 months worth. Three floating-type aerators mix, aerate, and agitate the wastewater within the cell of Lagoon No. 1.

A 400-gallon-per-minute pump applies wastewater from the lagoons to the land through a computerized center pivot system. The center pivot operates at low pressures (30 lbs/in.^{2}) to minimize aerosols and spray drift. The permit limits wastewater application to 25 acre-in./acre/year from March 15 through November 15 and limits leaching losses to 3 in./year.

In 2000, wastewater application began June 5 and continued through October 2. The end gun on the pivot was used during the majority of the time. However, from August 3 until August 28, the end gun was not used due to low pond levels. When used, the end gun increases the area of application from 65 to 73.5 acres.

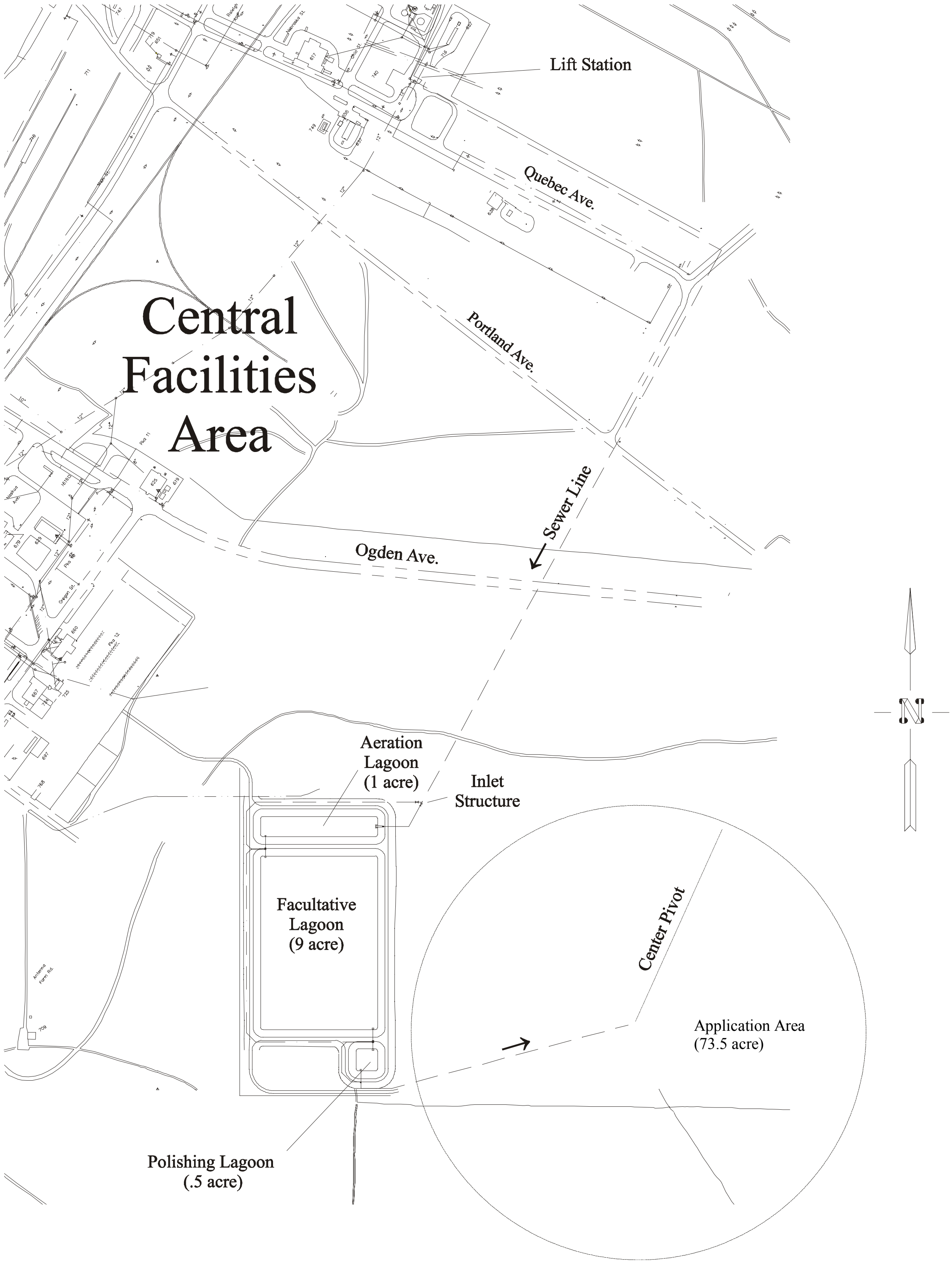


Figure 2-1. Central Facilities Area Sewage Treatment Plant.

The original WLAP issued for the CFA STP expired August 7, 1999 (IDEQ 1994). A renewal application was submitted February 9, 1999 (DOE-ID 1999a), and a letter authorizing the continued operation of the CFA STP under the original WLAP was issued September 18, 2000 (IDEQ 2000a).

2.3 Status of Special Compliance Conditions

No special compliance conditions were in effect in 2000.

2.4 Influent and Effluent Monitoring Results

The permit reporting period is from November 16, 1999, through November 15, 2000. However, to provide a more complete data set and for water balance calculations, it was deemed more appropriate to report data collected from December 1, 1999, through November 30, 2000.

Influent samples were collected monthly from the lift station at CFA (prior to the Lagoon No. 1) during the reporting period. Effluent samples were collected from the pump pit (prior to the pivot) starting in June and continuing through the months of pivot operation, with one exception. On October 2, 2000, the pivot was operated as part of the preventive maintenance performed in conjunction with seasonal shutdown, and no effluent samples were collected at that time. All samples collected were 24-hour composite samples, except the pH and coliform samples, which were collected as grab samples. Tables 2-1 and 2-2 summarize the influent and effluent results.

Yearly average concentrations for all parameters measured in the influent to the lagoons were at or below concentrations typically classified as “weak” municipal wastewater (biochemical oxygen demand [BOD] < 110, chemical oxygen demand [COD] < 250, total suspended solids [TSS] < 100, and total nitrogen [N] < 20 mg/L) (Metcalf and Eddy 1979). The average total Kjeldahl nitrogen (TKN) concentration in the influent was slightly less than that for permit year 1999, while average COD, BOD, and nitrate + nitrite concentrations were greater than those for permit year 1999. However, the 2000 permit year averages were within the historical ranges for these parameters.

The concentrations for all parameters (except pH) measured in the effluent discharged to the pivot were generally higher than those of the previous year. For TKN, nitrate + nitrite as nitrogen (NNN), and TSS, the measured concentrations fell within their historical range. The concentrations for BOD were the highest concentrations reported to date. Average total coliform counts were above the "secondary disinfected" wastewater classification of 23 colonies/100 mL (Idaho 1996a) as a result of an historical high count reported in September.

Removal efficiencies (REs) were calculated to estimate treatment in the lagoons and are presented in Table 2-3. Average REs for total N and BOD were lower than past years and were below their projected REs of 80%. REs for COD and TSS are within the ranges of the average REs calculated since the permit was issued, but were both below their projected REs of 70% and 80%, respectively. However, treatment in the lagoons was still sufficient to produce a good quality effluent for land application during the 2000 reporting period.

Table 2-1. Central Facilities Area Sewage Treatment Plant influent water quality data from lift station.

Sample Month	Sample Date	TKN (mg/L)	NNN (mg/L)	BOD (mg/L)	COD (mg/L)	TSS (mg/L)	pH
December	12/01/1999	17.00	0.320	59.0	110.0	39.00	7.61
January	01/26/2000	14.00	1.30	38.8	133.0	90.00	8.46
February	02/03/2000[a]	1.53	0.700	177.0	236.0	324.0	7.29
March	03/16/2000	18.50	0.559	41.0	90.0	22.00	7.78
April	04/26/2000	16.05[b]	0.01 U[b,c]	20.0 R[b,d]	67.25[b]	126.6[b]	8.10
May	05/03/2000	10.80	0.564	34.8	67.8	55.00	7.96
June	06/22/2000	10.70	0.742	27.0	55.8	37.00	7.77
July	07/20/2000	10.10	0.313	47.1	175.0	43.90	7.84
August	08/03/2000	8.23	0.978	19.0	160.0	26.20	7.69
September	09/26/2000	20.55[b]	0.654[b]	22.65[b]	86.5[b]	17.95[b]	7.60
October	10/10/2000	9.11	0.630	26.1	84.9	72.90	7.97
November	11/09/2000	24.10	0.018	39.6	145.0	106.0	8.29
Yearly Average[e]		13.39	0.57	48.4	117.6	80.05	7.86

a. This sample was described in the field logbook as darker than normal and containing black particulates. It was also noted that the pump was submerged, possibly indicating that the sample had been pulled from nearer the bottom of the pump pit than normal.

b. The result shown represents the average of duplicate samples taken for the month.

c. U flag indicates that the result was reported as below the detection limit.

d. Both results for the month were rejected during data validation. Therefore, the monthly average shown is not used in the average calculation.

e. Yearly average is determined from the average of the monthly values. ½ the reported detection limit was used in the yearly average calculation for those results reported as below the detection limit.

Table 2-2. Central Facilities Area Sewage Treatment Plant water quality data for effluent prior to pivot.

Sample Month	Sample Date	TKN (mg/L)	NNN (mg/L)	BOD (mg/L)	COD (mg/L)	TSS (mg/L)	pH	Total P (mg/L)	Fecal Coliform[a] (col/100 mL)	Total Coliform[a] (col/100 mL)
June	06/22/2000	4.46	0.052	5.00	64.30	15.00	8.48	2.37	6	7
July	07/20/2000	4.92	0.580	12.20 R[b]	58.00	10.90	8.27	3.43	16	20
August	08/03/2000	4.50	0.054	18.10	84.00	16.40	8.45	1.28	20	24
September	09/26/2000	1.91[d]	0.044[d]	3.30 U[d]	43.05[d]	7.20 U[d]	8.81	1.13[d]	0	140
Yearly Average[c]		3.95	0.183	8.25	62.34	11.48	8.50	2.05	11	48

a. Coliform samples were collected independent of the composite samples on 6/26, 7/24, 8/15, and 9/28.

b. R flag indicates that the result was rejected during data validation. Therefore, the result is not used in the average calculation.

c. ½ the reported detection limit was used in the yearly average calculation for those results reported as below the detection limit.

d. The result shown represents the average of duplicate samples taken for the month. A U flag indicates that all results for that month were reported as below the detection limit.

Table 2-3. 2000 removal efficiency[a] percentages for Central Facilities Area Sewage Treatment Plant permit monitoring parameters.

Sample Month	Total N[b] (%)	BOD (%)	COD (%)	TSS (%)
June 2000	61	81	NC[c]	60
July 2000	47	NC	67	75
August 2000	51	5	41	37
September 2000	91	93	50	69
Average RE	62	60	53	60

a. Removal efficiency (RE) = [(influent concentration - effluent concentration) ÷ influent concentration] × 100.

b. Total N is calculated as the sum of the TKN and NNN results.

c. NC – removal efficiency was not calculated since the effluent COD concentration was greater than the influent concentration, and the BOD effluent concentration was rejected during data validation.

2.4.1 Flow Volumes and Loading Rates

Daily influent flow readings were recorded at the flow meter prior to the first lagoon during the reporting period. Daily effluent flow readings were recorded at the pivot control panel when the pivot was operating. All flow readings were recorded in gpd Monday through Thursday. Values for Friday, Saturday, Sunday, and holidays, represent a daily average of the total recorded over the period. Table 2-4 summarizes monthly and annual flow data, and Appendix A presents daily flow readings.

Daily influent flows averaged less than 112,000 gpd, which was much less than the design flow of 250,000 gpd. Average daily flows continue to be greatest during the summer due to air conditioning usage. Total influent flow volume was approximately 41 million gallons (MG) for the reporting period. Discharge to the pivot averaged less than 175,000 gpd when it operated. Application rates did not exceed 0.1 acre-in./day.

Table 2-5 presents hydraulic and nutrient loading rates. The total volume of applied wastewater for 2000 was approximately 10.7 MG, which is significantly less than the design hydraulic loading of 40.5 MG. Hydraulic loading peaked in July. The low rate for October is the result of the pivot operating for only one day during the month. As stated previously, the end gun did not operate during part of August, reducing the application area to 65 acres during that period. The August rates presented in Table 2-5 reflect this reduced area. Nitrogen loading rates were significantly lower (5.3 lb/acre/yr) than the projected maximum loading of 32 lb/acre/year. As a general rule, nitrogen loading should not exceed the amount necessary for crop utilization plus 50%. However, wastewater is applied to native rangeland without nitrogen removal via crop harvest. To estimate nitrogen buildup in the soil under this condition, a nitrogen balance was prepared by Cascade Earth Sciences, Ltd. (CES) that estimated it would take 20 to 30 years to reach normal nitrogen agricultural levels in the soil (based on loading rates of 32 lb/acre/year) (CES 1993). The low 2000 nitrogen loading rate of 5.3 lb/acre/year had a negligible effect on nitrogen accumulation.

Table 2-4. Central Facilities Area Sewage Treatment Plant flow summaries.

	Influent to Pond				Effluent to Pivot			
Sample Month	Average (gpd)	Minimum (gpd)	Maximum (gpd)	Total (MG)[a]	Average (gpd)	Minimum (gpd)	Maximum (gpd)	Total (MG)[a]
December 1999	74,512	54,990	105,090	2.31	NF[b]	NF	NF	NF
January 2000	79,483	54,990	141,190	2.46	NF	NF	NF	NF
February 2000	89,034	70,080	138,550	2.58	NF	NF	NF	NF
March 2000	86,197	69,494	114,584	2.67	NF	NF	NF	NF
April 2000	95,752	80,707	145,266	2.87	NF	NF	NF	NF
May 2000	120,802	91,087	201,280	3.74	NF	NF	NF	NF
June 2000	132,078	109,209	186,639	3.96	173,130	142,575	191,575	2.60
July 2000	150,647	125,107	240,108	4.67	189,107	170,600	191,600	4.16
August 2000	159,746	120,583	243,465	4.95	148,033	134,400	189,900	1.78
September 2000	129,860	100,441	227,546	3.90	167,150	154,500	192,500	2.01
October 2000	118,508	99,820	189,944	3.67	189,700	189,700	189,700	0.19[c]
November 2000	95,890	58,154	157,160	2.88	NF	NF	NF	NF
Overall	111,137	54,990	243,465	40.68	173,052	134,400	192,500	10.74

a. Monthly and annual totals are shown in millions gallons (MG).

b. NF = No flow.

c. The pivot was operational for 1 day during October. Therefore, the total monthly flow is low when compared to other months.

The annual total COD loading at CFA STP for 2000 (72.5 lb/acre/year) increased over the past 2 years, but was still substantially less than the state guidelines of 50 lb/acre/day (which is equivalent to 18,250 lb/acre/year).

The annual total phosphorus loading rate was well below the projected maximum loading rate of 4.5 lb/acre/year. The small amount of phosphorus applied was probably removed by sorption reactions in the soil and utilized by vegetation, rather than lost to groundwater.

2.4.2 Volumetric Water Balance for Ponds

A volumetric water balance was developed for the CFA STP ponds in order to address measured discrepancies between influent and effluent flow volumes. The 1998 WLAP Site Performance Reports (LMITCO 1999) presented this water balance for 1996 through 1998. Seepage rates for the ponds were estimated at an average of 0.135 in./day based on: information for pond inflows (measured influent and precipitation), pond outflows (measured effluent to the pivot and an assumed pond evaporation rate of 45 in./year), and no net storage gain or loss over the evaluation periods.

Table 2-5. 2000 hydraulic and nutrient loading rates.[a]

	Applied Wastewater				
Sample Month	Total (MG)[b]	Per Acre (MG)	Total Nitrogen[c] (lb/acre)	COD (lb/acre)	Total P (lb/acre)
June	2.60	0.037	1.39	19.81	0.73
July	4.16	0.057	2.61	27.53	1.63
August[d]	1.78	0.026	0.99	18.19	0.28
September[e]	2.01	0.030	0.31	6.93	0.18
October[f]	0.19	0.003	NA[g]	NA	NA
Yearly Total	10.74	0.153	5.30	72.46	2.82

a. Loading rates calculated for wastewater application on up to 73.5 acres (hydraulic management unit MU-014101).

b. MG – million gallons.

c. Total N is determined from the sum of the TKN and NNN results.

d. The end gun was not used from August 3 until August 28, reducing the application area to 65 acres. The applied wastewater per acre and the nutrient loading rates reflect the reduced application area during that period.

e. All September nutrient loading rates are based on average monthly nutrient concentrations.

f. The low rates for October are the result of the pivot only operating for 1 day during the month.

g. Nutrient concentrations are not available to calculate the loading rates.

Because the calculated seepage rates exceeded the 0.125 in./day allowed by the Idaho Division of Environmental Quality (IDEQ) performance criteria (IDEQ 1991), seepage testing was performed at the CFA ponds in 1999. Testing was conducted in accordance with the IDEQ *Guidelines for Evaluating Seepage Rates* (IDEQ 1991) and was performed in May 1999. All testing was conducted prior to the initiation of wastewater application to isolate the lagoons during the test periods. Results of the testing indicated an average seepage rate for Lagoon No. 1 of 0.0141 in./day, and an average seepage rate for Lagoons No. 2 and No. 3 of 0.0157 in./day. Both values were significantly lower than estimated seepage rates for 1996–1998. Using the higher of these two values as an average seepage rate for the CFA STP ponds, the volumetric water balance was updated for permit years 1996 through 2000 (Table 2-6). Based on this water balance, evaporation rates were calculated to be significantly higher than the commonly accepted values of 32 to 46 in./year. As Table 2-6 shows, calculated evaporation rates ranged from 77.0 in./year (1999) to 98.0 in./year (1996). The calculated evaporation rate is the difference between the total inflow (measured), effluent to pivot (measured), and seepage (1999 seepage test).

In order to confirm evaporation rates at the CFA ponds, an evaporation pan test was conducted by Environmental Monitoring personnel for the period June 21 until October 2, 2000. During the study period, approximately 35.0 in. of water evaporated from the evaporation pan, accounting for approximately 60% of the total evaporation during the year. Using the pan data and applying a 0.75 correction factor for pan evaporation relative to pond evaporation (Fetter 1994) resulted in a calculated evaporation rate of 43.5 in./year. This rate closely agrees with the assumed evaporation rate of 45 in./year used in the original WLAP permit application information.

Table 2-6. Annual volumetric water balance for Central Facilities Area Sewage Treatment Plant ponds.

	Inflows			Outflows			
Year	Influent (gallons)	Precipitation gallons (inches)	Total (gallons)	Effluent to Pivot (gallons)	Seepage[a] gallons (inches)	Evaporation gallons (inches)	Total (gallons)
2000	40,680,000	2,160,000 (6.54)	42,840,000	10,740,000	1,890,000 (5.73)	30,021,000 (91.0)	42,840,000
1999	39,970,000	2,498,000 (7.57)	42,470,000	15,200,000	1,890,000 (5.73)	25,380,000 (77.0)	42,470,000
1998	40,270,000	3,470,000 (10.53)	43,740,000	13,770,000	1,890,000 (5.73)	28,080,000 (85.0)	43,740,000
1997	41,390,000	3,270,000 (9.92)	44,660,000	15,590,000	1,890,000 (5.73)	27,180,000 (83.0)	44,660,000
1996	42,810,000	3,015,000 (9.16)	45,830,000	11,640,000	1,890,000 (5.73)	32,300,000 (98.0)	45,830,000

a. Based on seepage test performed in 1999.

The calculated evaporation rates in Table 2-6 have been approximately twice the assumed evaporation rate of 45 in./year (and 43.5 in./year from 2000 evaporation pan study). Factors that may account for the difference between the assumed evaporation rate and the higher calculated evaporation rate include: (a) inaccurate flow readings; (b) mechanical aeration; (c) relative pond height above surrounding topography increasing wind effects; and (d) dark water/black pond liner heating water sufficiently to increase evaporation.

2.4.3 Soil Water Balance

A monthly water balance software package was prepared by Cascade Earth Sciences, Ltd. to determine leaching losses. This water balance software calculates leaching losses based on:

- Available soil storage capacity
- Precipitation
- Wastewater application
- Evapotranspiration.

This calculation:

- Assumes full soil profile water storage on April 1
- Applies an adjustment factor of 84% to the measured precipitation values to account for interception by vegetation onsite
- Applies an irrigation efficiency factor to the measured wastewater flows to account for evaporation resulting from spraying. (Irrigation efficiencies of 70% were used for the center pivot for June, July, and August, 80% for September, and 90% for October.)

Potential and actual evapotranspiration values are estimated based on average monthly temperatures and the volume of water stored in the soil, respectively. The National Oceanic and Atmospheric Administration measures monthly precipitation and temperature values at the CFA Weather Station.

A projected water balance was submitted to the IDEQ with the original permit application material. Table 2-7 shows the water balance for the 2000 reporting period. A total of 5.58 acre-in./acre of wastewater was applied over 73.5 acres during the 2000 reporting period, which was 2.03 in. less than that applied in 1999. This total, when adjusted for irrigation efficiency and added to the total adjusted precipitation for the reporting period, yields 9.52 acre-in./acre, which is well below the permit limit of 25 acre-in./acre/year. The relatively low volume of wastewater, coupled with below normal annual precipitation (by 2.2 in.) and monthly average temperatures that were slightly above normal (by 0.85°F), resulted in no leaching loss.

Table 2-7. Central Facilities Area Sewage Treatment Plant monthly water balance for 10.74 MG wastewater applied to the irrigation area.[a]

	Water Applied (in.)					Evaporation[b] (in.)			
Month	PPT[c]	ADJ PPT[c]	Waste[d]	ADJ Waste[d]	Total	PET	ACT	Stored in Soil	Leaching Loss[e]
December 1999	0.25	0.21	0	0	0.21	0.18	0.18	0.04	0
January 2000	0.68	0.57	0	0	0.57	0.18	0.18	0.42	0
February 2000	0.82	0.69	0	0	0.69	0.31	0.31	0.81	0
March 2000	0.78	0.66	0	0	0.66	0.56	0.56	0.90	0
April 2000	0.57	0.48	0	0	0.48	1.53	1.43	8.22	0
May 2000	1.31	1.10	0	0	1.10	2.67	2.40	6.92	0
June 2000	0.20	0.17	1.22	0.85	1.02	4.09	3.24	4.71	0
July 2000	0.30	0.25	2.20	1.54	1.79	5.44	4.06	2.44	0
August 2000	0.07	0.06	1.02	0.71	0.77	4.93	3.47	0.00	0
September 2000	0.27	0.23	1.04	0.83	1.06	2.34	2.15	0.00	0
October 2000	0.98	0.82	0.10	0.09	0.91	1.05	1.04	0.00	0
November 2000	0.31	0.26	0	0	0.26	0.25	0.25	0.01	0
Total:	6.54	5.49	5.58	4.03	9.52	23.53	19.26	0	0
				Soil-Available Water Capacity[f]:				8.22	

a. Water balance was calculated using the method outlined in *Irrigation Water Requirements* (Department of Agriculture 1979).

b. PET = potential evapotranspiration; ACT = actual evapotranspiration.

c. PPT = precipitation. ADJ PPT = adjusted precipitation. An efficiency factor was applied to the raw monthly data to account for interception by native vegetation (Linsley 1982).

d. Waste = applied wastewater. ADJ Waste = applied waste water adjusted for irrigation losses. A monthly efficiency factor was applied to correct for irrigation losses due to evaporation (Department of Agriculture 1986).

e. Leaching losses of water moving below the rooting zone (assumed to be a depth of 52 in.).

f. Soil-available water capacity was determined from field measurements and textural analyses to be 8.22 in.

2.5 Evaluation of Groundwater Data

Groundwater monitoring is not required by the current permit based on the following:

- Quantity and quality of water discharged
- Local geology and hydrology
- Distance to nearest downgradient drinking water well (Experimental Breeder Reactor [EBR]-I production well approximately 3.5 mi southwest).

However, as discussed in previous WLAP reports, groundwater sampling results of several wells downgradient of the STP identified nitrate + nitrite near or above the applicable state groundwater quality limits. These limits are the primary constituent standards (PCSs) and secondary constituent standards (SCSs) as specified in IDAPA 58.01.11, "Ground Water Quality Rule" (Idaho 1997).

Three wells, which were constructed as part of the CFA regional groundwater monitoring network in 1995 (CFA-MON-A-001, -002, and -003), are located generally downgradient of the new CFA STP (Figure 2-2). From 1995 through 1999, nitrate + nitrite concentrations in well CFA-MON-A-001 were well below the primary constituent standard of 10 mg/L (Figure 2-3). The well was not sampled during the 2000 permit year. Over the same period, the nitrate + nitrite concentrations in wells CFA-MON-A-002 and -003 (Figures 2-4 and 2-5, respectively) were near or above the primary constituent standard. As a result, the nitrate + nitrite data from CFA-MON-A-002 and CFA-MON-A-003 were analyzed to determine if statistically significant trends could be identified. Based on data collected over 5 years, CFA-MON-A-002 exhibited a statistically significant decrease in nitrate + nitrite concentrations, while no significant change was indicated for CFA-MON-A-003. However, nitrate + nitrite concentrations in CFA-MON-A-003 are generally at or below the 10 mg/L standard.

Several evaluations have been conducted to determine the potential source of the nitrate + nitrite. The most recent evaluation (BBWI 2000c) was completed by Waste Area Group (WAG) 4, which is responsible for implementing characterization and cleanup activities at CFA under the INEEL's Federal Facilities Agreement and Consent Order (FFA/CO) as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Program. On the basis of a nitrogen isotope analysis, it was concluded that the most likely source of the nitrate + nitrite contamination was from the former CFA STP drainfield that ceased operation in 1995 when it was replaced by the new CFA STP. The new CFA STP was ruled out as the source based on effluent concentrations and the vadose zone and groundwater travel time between the new CFA STP and the wells (BBWI 2000d). Total nitrogen concentrations in the CFA STP effluent are consistently too low to provide a steady source of nitrate from lagoon seepage at the levels detected in the wells. In addition, based on water balance calculations showing minimal leaching losses from land application, it is improbable that any effluent is migrating from the land application area to the aquifer. Finally, it was determined that the new CFA STP was not the likely source because of its distance from the wells. The new CFA STP is approximately 2,000 ft from the wells, and groundwater flow velocity averages about 6 ft/day in the CFA area. Therefore, for nitrate + nitrite from the new CFA STP to reach the well, it would take approximately 333 days, excluding travel time in the vadose zone. The new CFA STP went on line in February 1995, and relatively high levels of contamination were detected in the wells in April 1995, or about 1 month, rather than over 300 days.

The groundwater nitrate + nitrite concentrations will continue to be monitored and reported by the INEEL FFA/CO Program, since the source is not believed to be the new CFA STP.

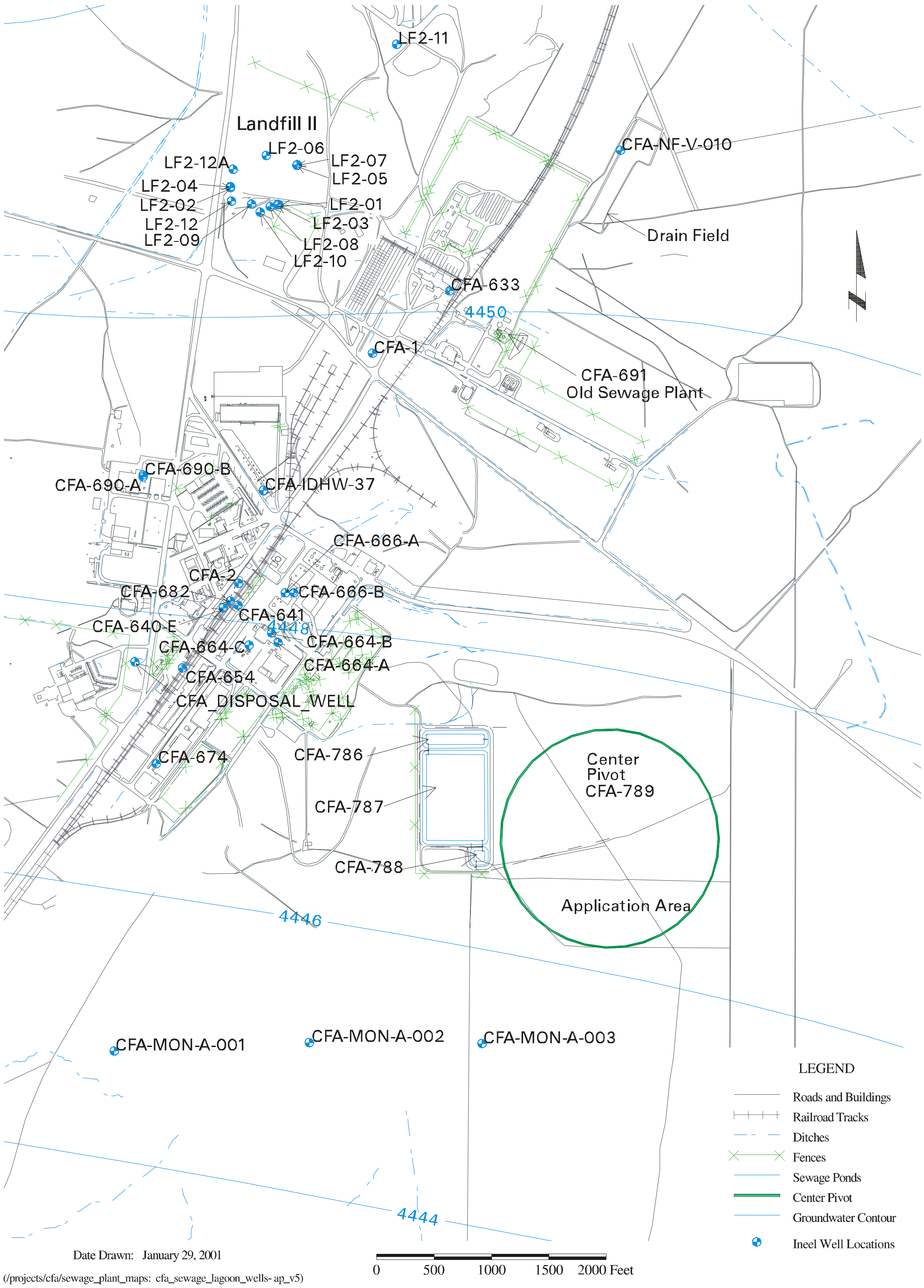


Figure 2-2. Locations of monitoring wells in the vicinity of the Central Facilities Area Sewage Treatment Plant.

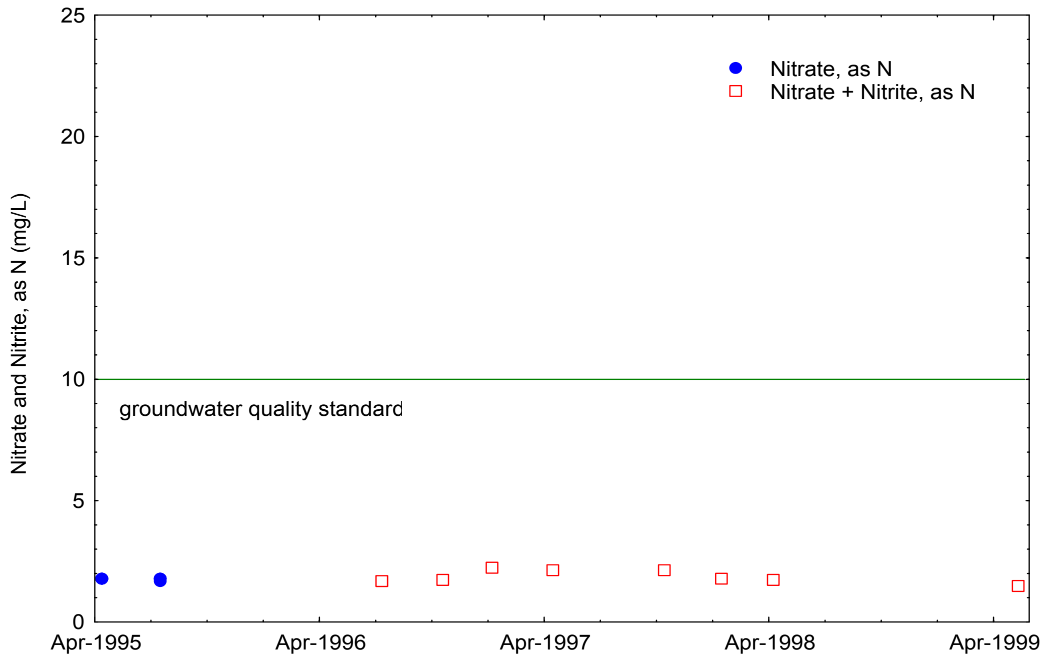


Figure 2-3. Nitrate and nitrite (as N) at CFA-MON-A-001.

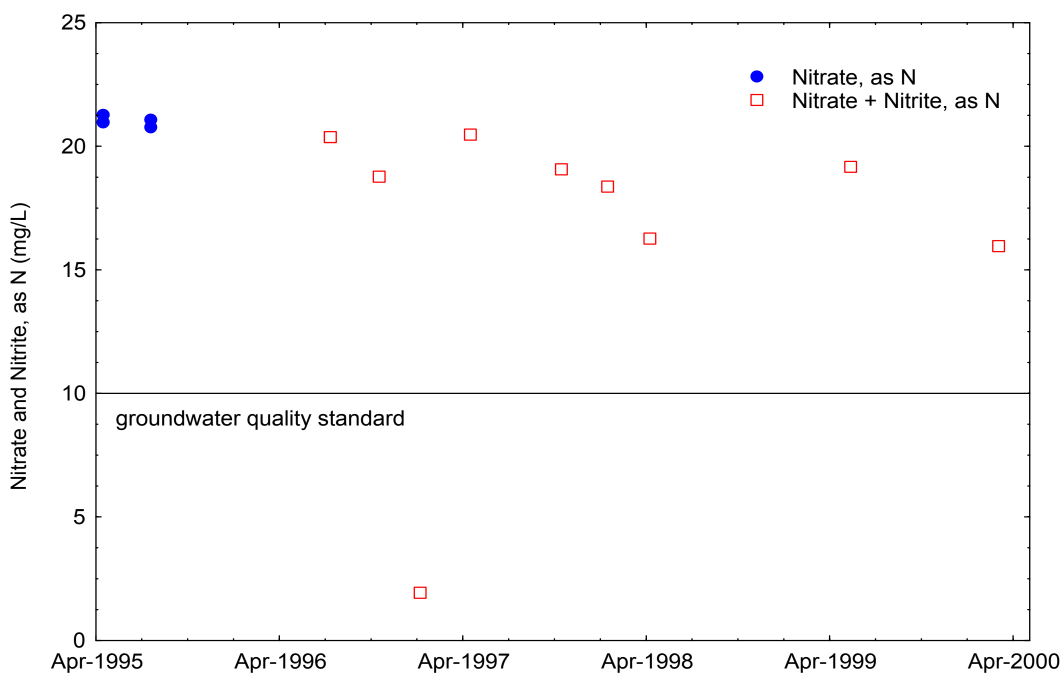


Figure 2-4. Nitrate and nitrite (as N) at CFA-MON-A-002.

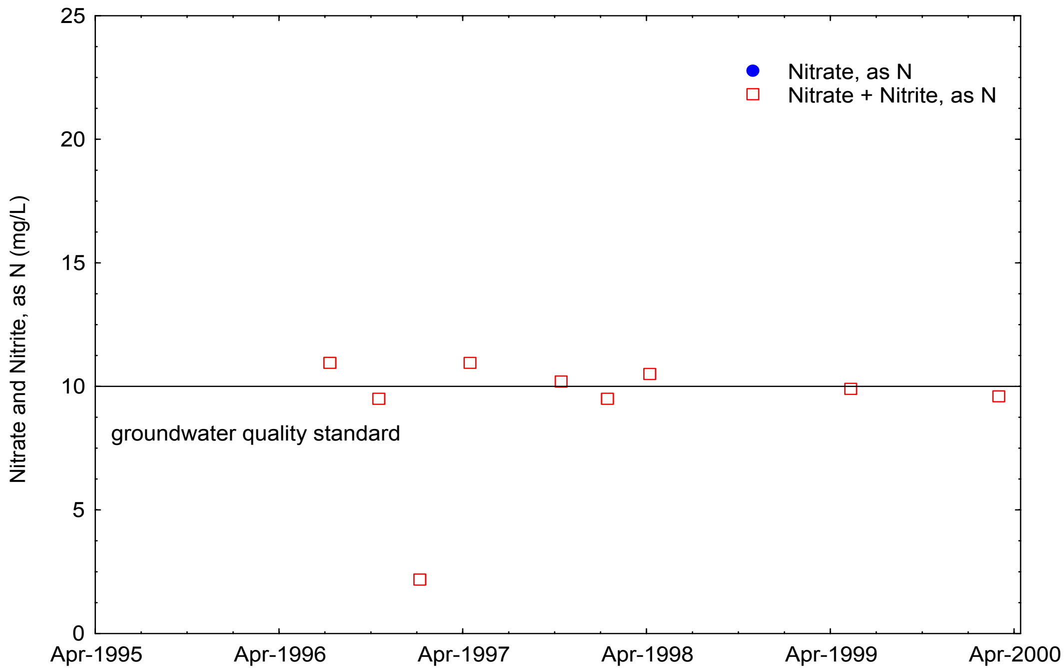


Figure 2-5. Nitrate and nitrite (as N) at CFA-MON-A-003.

2.6 Soil Monitoring

Cascade Earth Sciences, Ltd. characterized soils at the CFA STP prior to construction. Soils in the upper 6 in. are predominantly silty clay loam, and from 6 to 52 in. are predominant silty loam. Soils at CFA were determined to be suitable for slow-rate wastewater application (EG&G 1993).

Soils have since been sampled from the land application area (locations 1 through 5 shown in Figure 2-6) following each application season. Subsamples are taken from 0–12 in. and 12–24 in. at each location and composited, yielding two composite samples, one from each depth. These results are presented in Table 2-8. In addition, preapplication data collected by Cascade Earth Sciences, Ltd. are presented for comparison purposes.

pH levels have remained fairly constant during the application period (Table 2-8). Percent organic matter has varied around preapplication concentrations; however it is expected to take several years for decomposed vegetation to be incorporated into the soil profile.

The soil salinity levels are within acceptable ranges, based on electrical conductivity (EC) results. Soil salinity levels between 0–2 mmhos/cm are generally accepted to have negligible effects on plant growth. Electrical conductivity remains near preapplication levels.

Sodium adsorption ratio (SAR) results were low throughout the permit period. However, SARs were slightly elevated on the surface relative to preapplication levels and appeared to increase over time. SARs in the deeper interval remain relatively unchanged. The SAR is an indicator of the exchangeable sodium levels in the soil. Soils with high exchangeable sodium levels tend to crust badly or disperse, which greatly decreases soil hydraulic conductivity. Soils with SARs below 15 and ECs below 2 mmhos/cm are generally classified as not having sodium or salinity problems (Bohn et al. 1985).

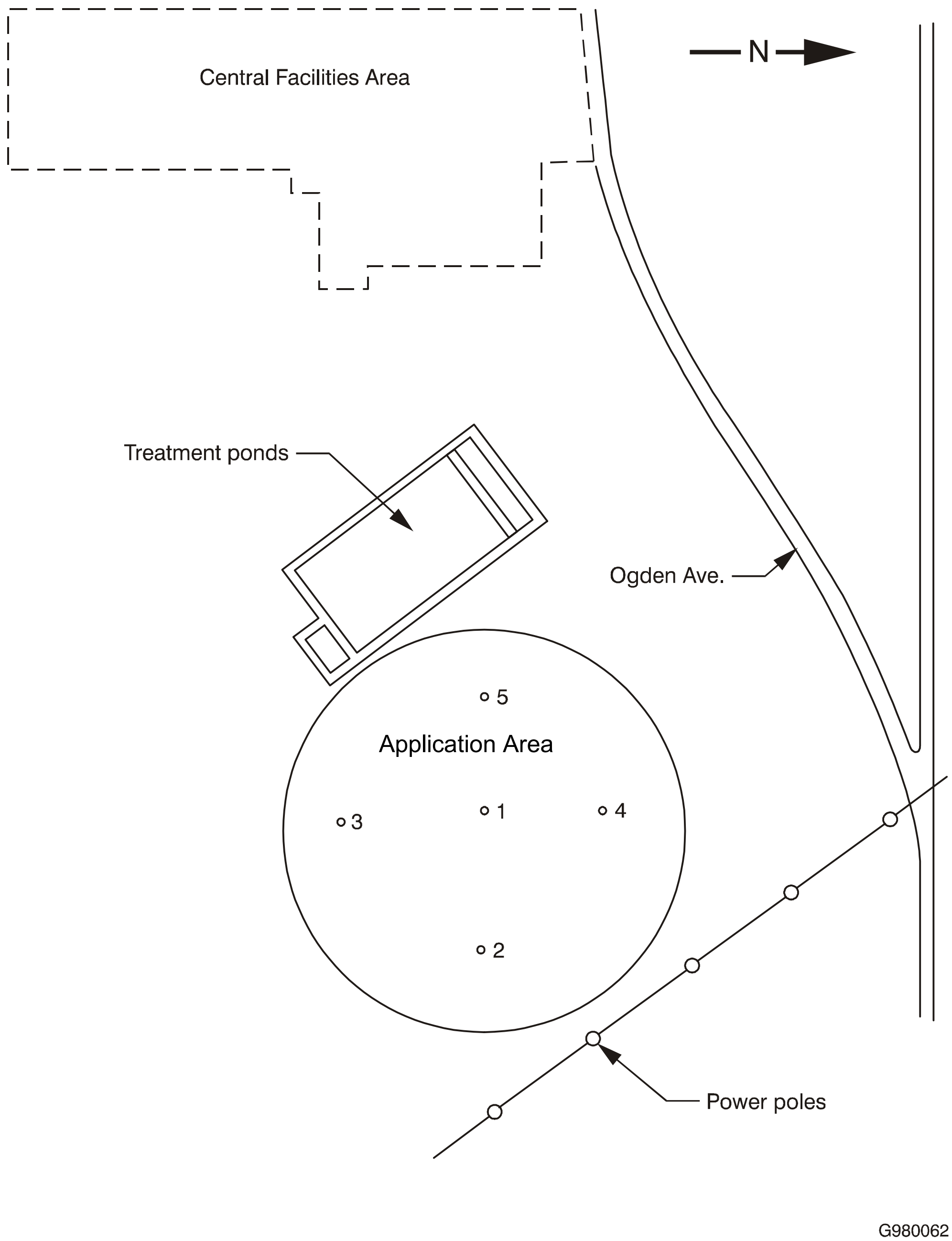


Figure 2-6. Central Facilities Area soil monitoring locations.

Table 2-8. Central Facilities Area Sewage Treatment Plant application area soil monitoring results.

Parameter	Preapplication Period[a] Depth (in.)	Preapplication Period[a] 1993	Application Period Depth (in.)	1995	1996	1997	1998	1999	2000
pH	0–6	7.6	0–12	NA[b]	8.1	8.4	8.2	8.0	8.2
	6–16	8.0	12–24	NA	8.1	8.6	8.4	8.3	8.3
	16–30	8.1							
Electrical Conductivity (mmhos/cm)	0–6	0.6	0–12	1.2	0.9	0.37	0.362	0.620	0.58
	6–16	0.7	12–24	0.8	1.1	0.32	0.198	0.462	0.31
	16–30	0.6							
Organic Matter (%)	0–6	2.2	0–12	NA	1.87	1.23	0.630	3.09	2.10
	6–16	1.6	12–24	NA	1.37	0.59	0.563	2.29	0.98
	16–30	1.4							
Total Kjeldahl Nitrogen (ppm)[c]	0–6	1,200	0–12	1,310	1,500	1,500	733	917	1,200
	6–16	900	12–24	930	1,300	700	362	500	540
	16–30	500							
Nitrate Nitrogen (ppm)	0–6	16	0–12	6	6	<2.5	2.05	1.81	4.12
	6–16	6	12–24	3	5.2	<2.5	0.43	<1	<2.25
	16–30	3							
Ammonium Nitrogen (ppm)	0–6	7.9	0–12	5.9	6.1	1.83	<1.0	2.63	2.31
	6–16	7.6	12–24	5.5	6	1.49	<1.0	1.30	1.41
	16–30	7.4							
Phosphorous (ppm)[d]	0–6	29	0–12	3,250[e]	12	8.18	9.84	4.90	7.1
	6–16	18	12–24	2,750[e]	10.2	2.76	6.46	<2	<2.0
	16–30	12							
Sodium Adsorption Ratio	0–6	1.0	0–12	0.35	1.35	1.42	2.46	3.33	2.86
	6–16	1.4	12–24	0.31	0.85	1.35	0.83	2.51	1.00
	16–30	2.6							

a. Preapplication sample results were based on a composite of three representative samples taken at each depth. Preapplication soil depths and locations differ from permit samples.

b. NA = Samples were collected, however the laboratory failed to analyze them.

c. TKN was not a required parameter for the permit, but was analyzed for additional information.

d. Available phosphorous was analyzed rather than the total phosphorus analysis specified in the permit

e. Total phosphorous was analyzed rather than available phosphorous during 1995.

Nitrogen data suggest negligible nitrogen accumulation from wastewater application. In 1995 through 1997, surface soil TKN concentrations were slightly greater than the preapplication concentrations. Since 1998, they have remained at or below preapplication concentrations. Ammonium (NH_4N) and nitrate (NO_3N) concentrations remained well below preapplication concentrations. The low soil-available nitrogen (NH_4N and NO_3N) concentrations suggest that the native sagebrush and grass vegetation utilize all of the plant-available nitrogen, and that the total nitrogen application is low. Increased nutrients and water from wastewater application may be stimulating plant growth, which in turn rapidly utilizes plant-available nitrogen. The ammonium and nitrate nitrogen concentrations are comparable to those of nonfertilized, background agricultural soils.

The permit requires total phosphorus analysis of soils; however, since the total phosphorous content includes the digestion of phosphate minerals, the results of total phosphorous analyses are not indicative of plant-available phosphorous or water-soluble phosphorous that could leach to groundwater. Phosphorous soluble in sodium bicarbonate is the common method for determining plant-available and soil-solution phosphorous, which can then be correlated to fertilizer needs or environmental concerns. Therefore, this analysis was requested for the 1996 through 2000 soil monitoring analyses. Available phosphorous concentrations decreased to below preapplication levels. Available phosphorous concentrations were slightly less than the concentration considered adequate for range and pasture crop growth (EPA 1981).

2.7 Special Studies

2.7.1 Soil Profile Impact Study

In addition to permit-required soil sampling, additional soil and soil pore-water sampling was initiated in 1997 as part of an ongoing special study. The primary objective of this study was to evaluate the effects additional nitrogen and salt loading have on the soil profile in a native sagebrush steppe environment (one of three plant communities in the application area) and implications on the long-term ecological health of the area. This study planned to measure soil chemistry for the same constituents (except phosphorous) as those required for the WLAP inside the application area and compare them to similar measurements made immediately outside the application area in the same plant community. Lysimeters were also installed to extract soil pore-water at the same locations and depth intervals as the soil samples.

Sampling locations were chosen based on their proximity to the Environmental Science and Research Foundation's (ESRF's) neutron probe access tubes. During the summer of 1997, a cluster of three lysimeters (at 12, 24, and 36 in. depths) were placed adjacent to five neutron probes within the application area, and five neutron probes were placed in an adjacent control area. Soil pore-water sampling began at these locations in the spring of 1998 and continued in the spring of 1999. While soil pore-water sampling was not conducted in 2000 due to limited resources, soil sampling was conducted at 0–12, 12–24, and 24–36 in. depths in May and again in November in conjunction with the WLAP permit-required sampling.

Results for the special study were comparable to the soil data collected for the permit within the application area (Section 2.6). Some differences exist between the permit preapplication levels and those in the special study control area over time. These differences could be attributed to the larger number of samples that were analyzed and collected within the same plant community for the special study and the fact that the preapplication samples resulted from a one-time sampling event.

Soluble salts were elevated inside the application area compared to the control area for the past 4 years in the surface interval (Figure 2-7). However, soil salinity levels are still in the range of those from the permit sampling and are considered to have a negligible effect on plant growth. SAR levels were also elevated in the 0-12 in. interval of the application area when compared to the control area (Figure 2-8). However, as stated in Section 2.6, soils with ECs below 2 mmhos/cm and SARs below 15 are generally classified as not having sodium or salinity problems.

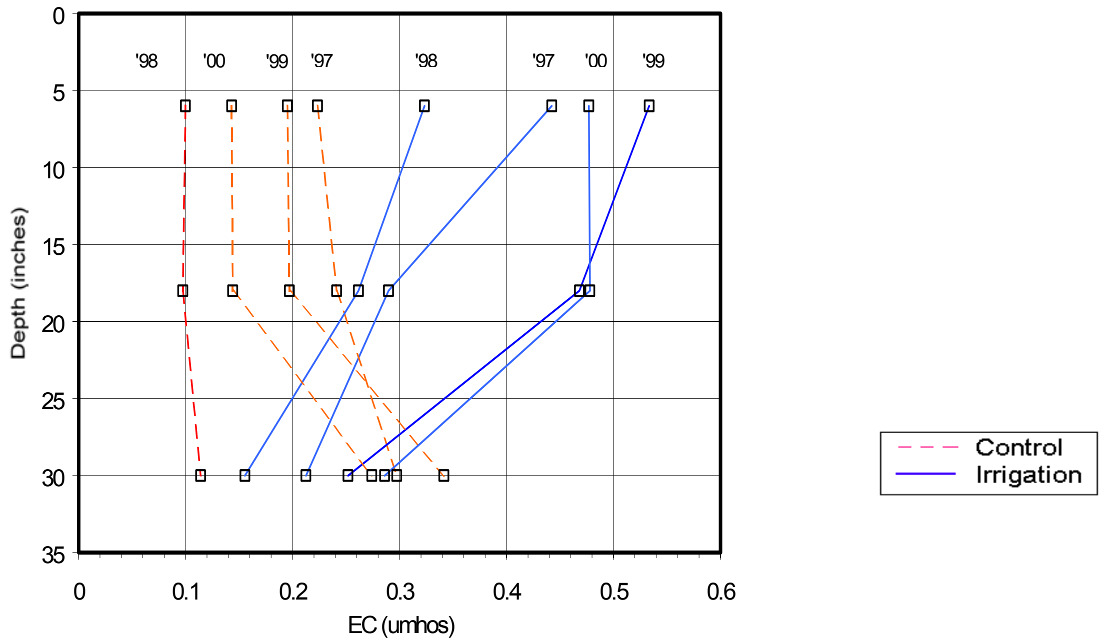


Figure 2-7. Electrical conductivity vs. soil depth (fall sampling).

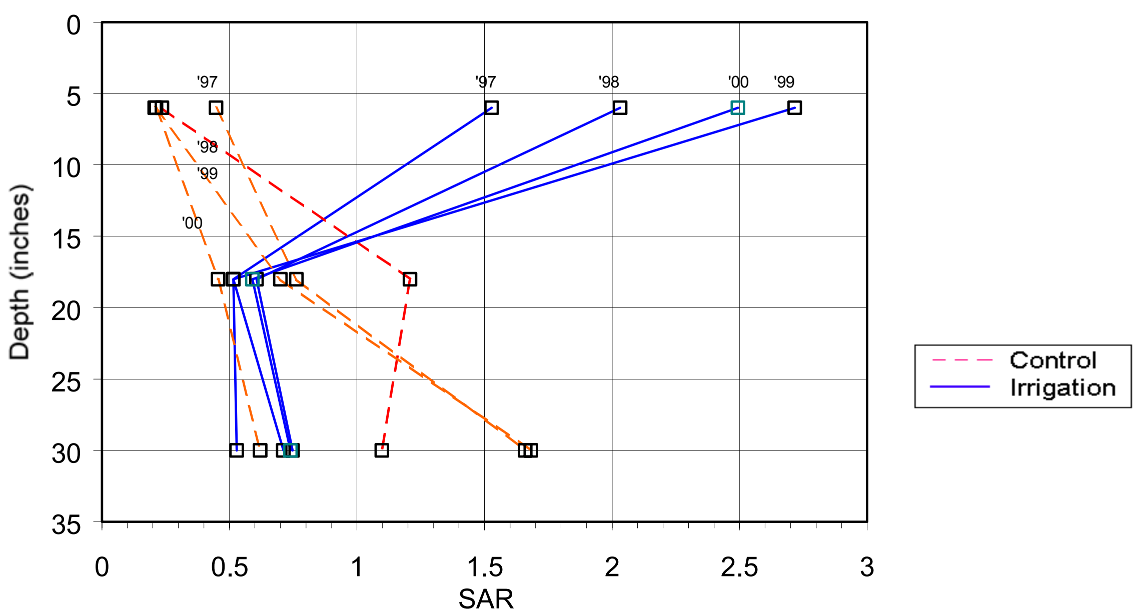


Figure 2-8. Sodium adsorption ratio vs. soil depth (fall sampling).

Ammonium, nitrate as nitrogen, and TKN concentrations found in the soil have remained very low. As stated in Section 2.6, it is possible that increased nutrients and water available to the plants as a result of wastewater application are actually stimulating plant growth, resulting in rapid utilization of plant-available nitrogen and ammonium.

Percent organic matter in the application area remains similar to that of the control area. Significant changes in the percentage of organic matter within the application area are not expected for several years until plant matter from several growing seasons is incorporated into the soil profile. Soil pH appears to be unaffected by the application of wastewater.

Soil-pore water samples were not taken in 2000 due to limited resources. An attempt may be made to extract soil-pore water samples in spring of 2001, depending on soil conditions and available resources.

2.7.2 Ecological Impact Study

In 1996, a special research study at the wastewater application area began. The primary objective of the research study was to determine the ecological benefits or hazards of applying wastewater on native vegetation in semiarid regions. Specific objectives were developed to determine the potential for impacts on rangeland quality, resident wildlife populations, and soil water balance; and the potential for trace metal contamination of the environment. Additionally, the study would measure plant community characteristics, soil moisture, wildlife use, and plant and soil chemistry inside the wastewater application area and compare them to similar measurements immediately outside the wastewater application area (control area).

Plant species composition and cover were determined at 20 points inside and 20 points outside the application area. The present vegetation inside the application area includes at least three distinct community types:

- Sagebrush steppe
- Crested wheatgrass planting
- Transitional zone between sagebrush steppe and crested wheatgrass.

Sampling locations were assigned such that each of these community types was adequately represented. At the same locations, access tubes for neutron moisture probes were installed. Soil moisture was measured weekly during the growing seasons at 8-in. intervals to a maximum depth of 6.5 ft. Vegetation data were also collected. Transects were also established for small mammal trapping both inside and outside the wastewater application area to determine species composition and abundance. The transects were generally the same location as those used for the vegetation and soil moisture measurements. A transect for the breeding bird survey was also established at the wastewater application area.

The following subsections summarize studies performed during the 2000 permit year. Refer to past WLAP annual reports for information on the ecological studies performed during pervious permit years.

2.7.2.1 Vegetation

During 2000, total plant cover was found to be 50% in the wastewater application area and 51% in the control areas. Grass cover was higher in the application area (26%) than the control area (19%). Shrub cover was 23.9% in the application area and 39.7% in the control area. In 1999, there was concern of greatly increased abundance of annual and biennial plants (weeds) in the application area. Although total cover by these species was down in 2000, they remain a concern. In the sagebrush steppe community portion of the application area, prickly lettuce (*Lactuca serriola*) had more than 2% cover. However, the native annual (not a weed) desert alyssum (*Alyssum desertorum*) was the most abundant forb in the sagebrush steppe community in the control area (3.4%); it was greatly reduced in the application area (0.4%). Cheatgrass (*Bromus tectorum*) cover was similar in the application area and the control area and represented about 1% cover in the sagebrush communities. It was absent from the crested wheatgrass communities.

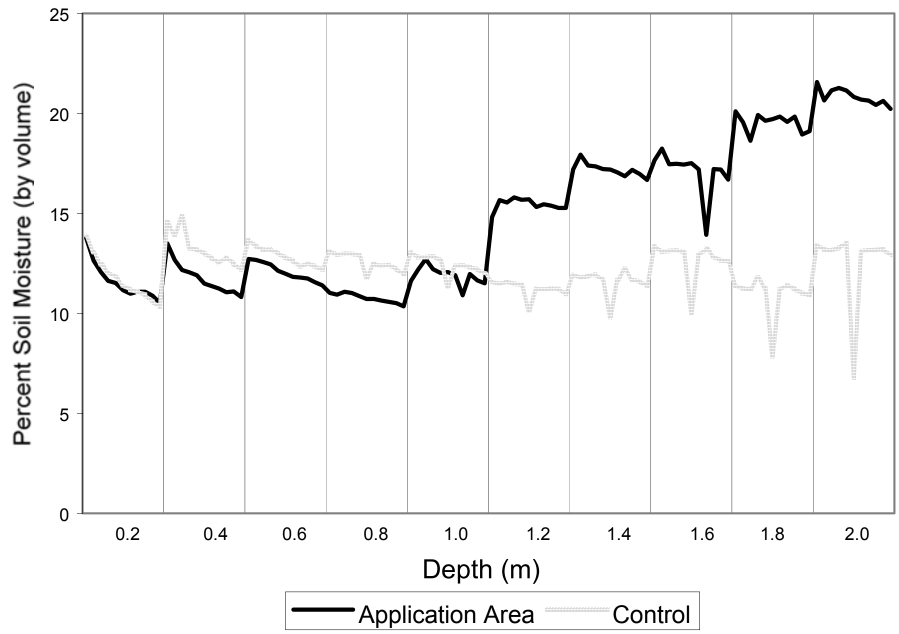
The Simplified Morisita's Similarity Index (Morisita 1959) was used to determine how similar the plant communities were between the application and control areas for each community type by each permit year (Table 2-9). This index returns a value of 1.0 for two plant communities that are identical and a value of 0.0 for two communities that have no similar community elements. These values can be considered as a "percent similarity." These data show the crested wheatgrass and transition community types do not appear to be diverging in their community structure because of wastewater application. The value of the index for these community types has remained relatively high, suggesting the application and control communities are quite similar. The sagebrush steppe community continues to show the lowest index value (0.79 in 2000), suggesting that it is more susceptible to change due to wastewater application than the communities dominated by crested wheatgrass.

Table 2-9. Simplified Morisita's Similarity Index measuring similarity of vegetation community structure between wastewater application and control areas for each community type.

	Permit Year				
Community Type	1996	1997	1998	1999	2000
Crested Wheatgrass	0.99	0.85	0.96	0.95	0.97
Transition	0.82	0.73	0.93	0.89	0.98
Sagebrush Steppe	0.83	0.93	0.85	0.61	0.79

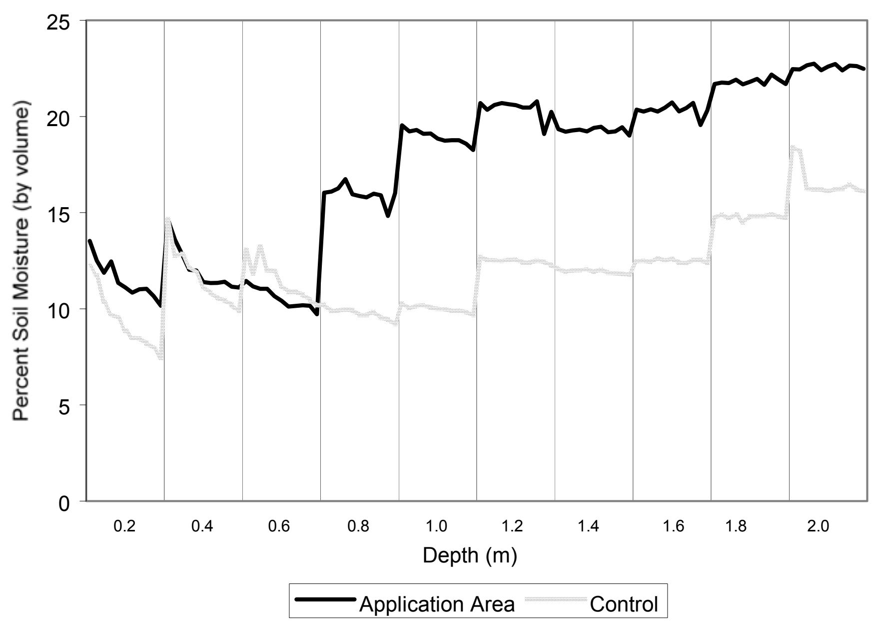
2.7.2.2 Soil Moisture

Soil moisture in all vegetation community types in the wastewater application area generally increased as soil profile depths increased (Figures 2-9, 2-10, and 2-11). In the control areas, soil moisture did not vary as greatly with soil depth. In the sagebrush steppe community, soil moisture at depths less than approximately 3.3 ft (1.0 m) was actually lower in the application area than in the control area. This suggests higher rates of transpiration by sagebrush in the application area. In general, soil moisture is similar between the application and control areas at the shallower soil depths. In the crested wheatgrass and transition community types, soil moisture increases in the application area at depths below approximately 2 to 2.6 ft (0.6 to 0.8 m). In the sagebrush steppe community, this change occurs at approximately 3.3 to 3.9 ft (1.0 to 1.2 m) deep. This probably represents the difference in effective rooting depth of the dominant species in these plant communities. Crested wheatgrass roots tend to be shallower than sagebrush and most other shrubs. The seasonal patterns of soil moisture deeper in the soil profile suggest that plant roots are removing little moisture.



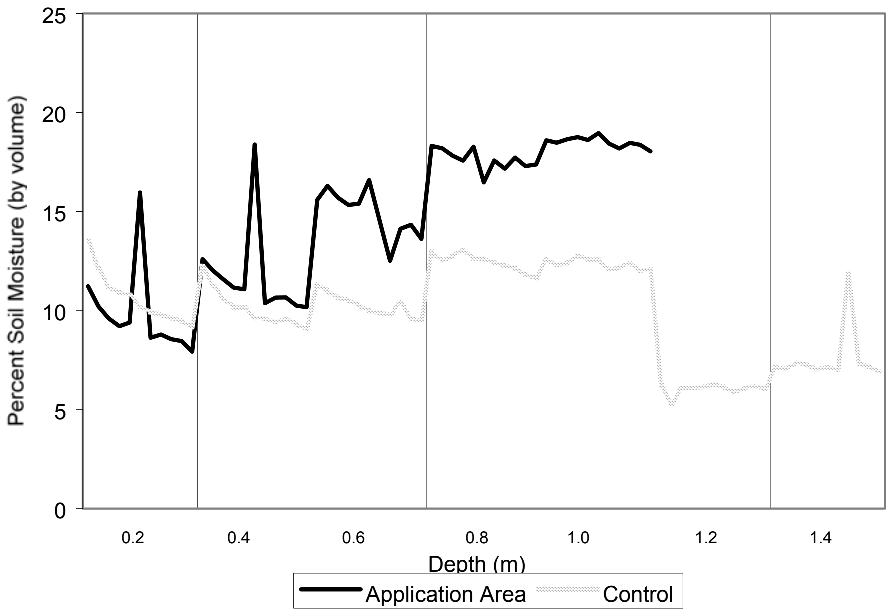
NOTE: Individual data points within each depth represent seasonal trend at that depth.

Figure 2-9. Soil moisture in the sagebrush steppe community with and without wastewater application.



NOTE: Individual data points within each depth represent seasonal trend at that depth.

Figure 2-10. Soil moisture in the transition community with and without wastewater application.



NOTE: Individual data points within each depth represent seasonal trend at that depth.

Figure 2-11. Soil moisture in the crested wheatgrass community with and without wastewater application.

2.7.2.3 Animal Species

During 2000, breeding bird surveys continued on the wastewater application area. Western Meadowlark continues to be the most prevalent species at the application area. The breeding bird complement on the application area was similar to that found on the CFA breeding bird survey route.

Small mammal surveys and big game pellet counts were not conducted in 2000.

2.8 Summary of Environmental Impacts

Operations of the CFA STP appeared to have little environmental impact during the 2000 reporting period. The relatively weak wastewater influent, followed by treatment in the CFA STP lagoons, produced a good quality effluent for application for the 2000 reporting period. When combined with an annual hydraulic loading rate that was lower than that of the design criteria, the nutrient loading rates were below projected levels. Soil and weather conditions combined with the relatively low volume of wastewater applied during the permit year resulted in no leaching loss for the year, compared to the permit limit of 3 in. per year. As a result, land application of wastewater appeared to have negligible impact on soils and groundwater. Soil sampling in the application area showed a slight increase in sodium adsorption ratio above the preapplication levels in the upper soil horizon and elevated levels when compared to the nonirrigated areas adjacent to the application area. The impact to vegetation in the application area continues to suggest that the sagebrush steppe community is more susceptible to change as a result of wastewater application than other communities. No impact to breeding bird species was evident during the 2000 reporting period.

Evaluations conducted to date into the high nitrate + nitrite concentrations detected in the groundwater near the new STP have determined that the new STP was not the likely source. Since the source is not believed to be the STP, WAG 4 (under the INEEL FFA/CO) will continue to monitor the groundwater nitrate + nitrite concentrations.

3. IDAHO NUCLEAR TECHNOLOGY AND ENGINEERING CENTER PERCOLATION PONDS DATA SUMMARY AND ASSESSMENT

3.1 Site Description

The Idaho Nuclear Technology and Engineering Center is a 210-acre, multipurpose plant located on the INEEL (Figure 3-1). It was constructed in 1951 and presently includes approximately 230 buildings and structures. Within INTEC are all of the facilities necessary to receive and store spent nuclear fuels, process the fuels to recover uranium-235, and handle waste generated by those functions. However, due to a change in mission in 1992, uranium-235 is no longer recovered at INTEC. Currently, INTEC receives and stores spent nuclear fuel and isolates and solidifies the waste fission products resulting from the spent fuel recovery process. In addition, research and development work is conducted to develop and improve fuel management and waste processing technologies.

The Idaho Nuclear Technology and Engineering Center generates 1.5 to 2.5 MG/day of process wastewater during normal operations. This wastewater, commonly called service waste, is discharged to Percolation Ponds No. 1 or No. 2 (Figure 3-2) via the service waste system. In the event of unusual circumstances, the Percolation Ponds could accommodate up to 5 MG/day.

The Percolation Ponds receive only the discharge of nonhazardous wastewater. Hazardous wastewater from INTEC processes and laboratories is disposed of in accordance with applicable Resource Conservation and Recovery Act regulations. Sanitary wastes from restrooms and the INTEC cafeteria are either discharged to the STP or directed to on-Site septic tank systems.

3.2 System Description and Operation

The service waste system serves all major facilities at INTEC. This process-related wastewater from INTEC operations consists of:

- Steam condensates
- Noncontact cooling water
- Reverse osmosis, water softener and demineralizer regenerate, and boiler blowdown wastewaters
- Other nonhazardous liquids.

All service waste enters CPP-797, the final sampling and monitoring station, prior to discharge to the Percolation Ponds. In CPP-797, the combined effluent is measured for flow rate and monitored for radioactivity, and samples are collected for analyses. No radioactivity is expected since multiple simultaneous failures would first have to occur. However, if radioactivity is detected above a trigger level, all contaminated waters would be diverted to diversion tank VES-WM-191 rather than discharged to the Percolation Pond. Two sets of two pumps transfer the wastewater from CPP-797 to the Percolation Ponds.

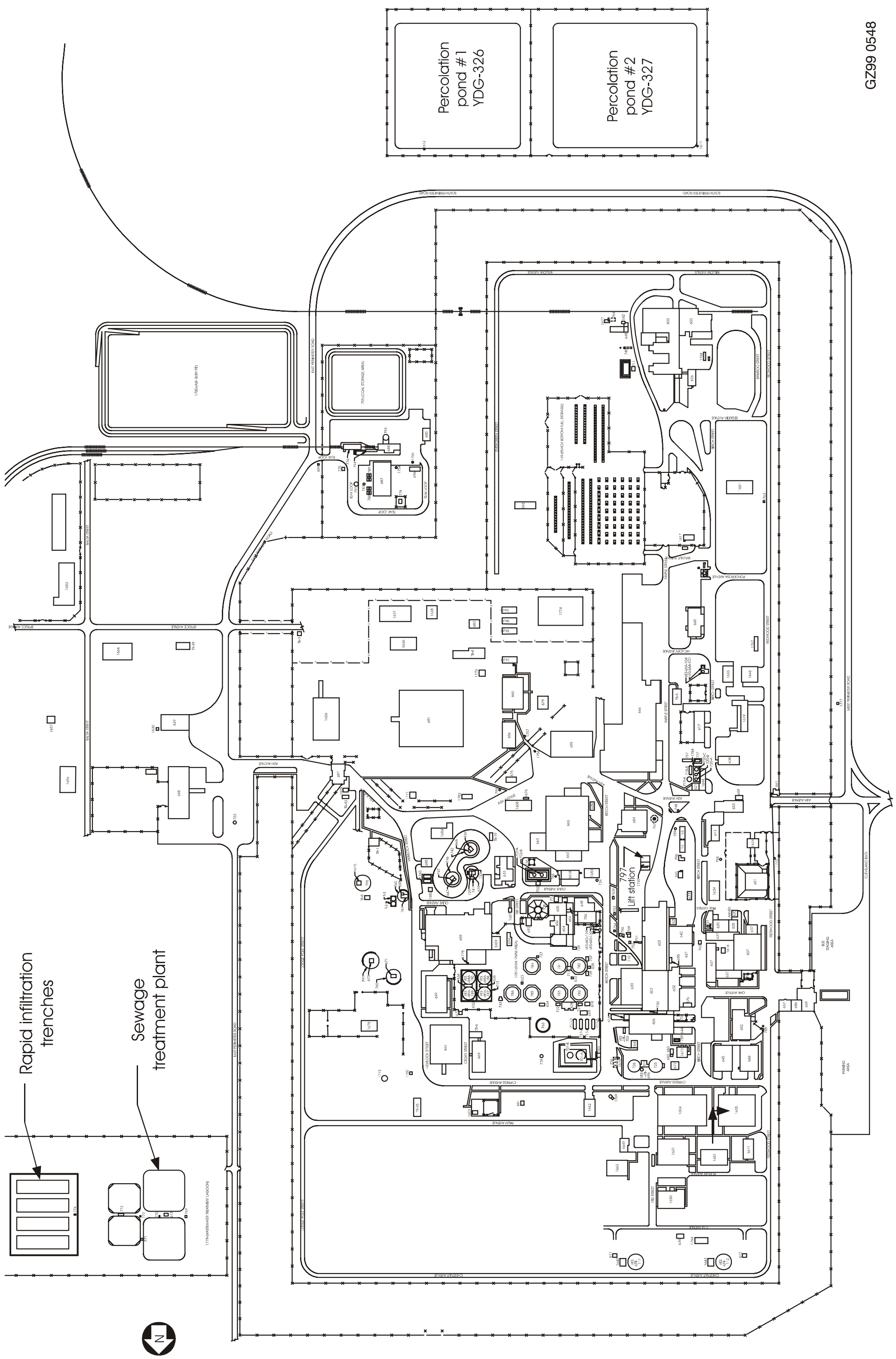


Figure 3-1. Idaho Nuclear Technology and Engineering Center facility map showing the Sewage Treatment Plant and Percolation Ponds.

Figure 3-2. Idaho Nuclear Technology and Engineering Center Percolation Ponds.

Percolation Pond No. 1, located southeast of CPP-603, is approximately 480 × 410 ft at the top and 16 ft deep. The gravelly alluvium in which the pond was excavated is approximately 20 to 35 ft thick and overlies basalt. Prior to operation, soil was backfilled into the pond to its present depth of 16 ft. The pond is designed to accommodate continuous discharge of approximately 2 MG/day.

Percolation Pond No. 2 is located immediately west of Percolation Pond No. 1. It is approximately 500 × 500 ft and 12 to 14 ft deep. Percolation Pond No. 2 was built by removing approximately 12 ft of surficial sediments. The thickness of the remaining surficial sediments is estimated to range from 20 to 40 ft. The pond is designed to accommodate continuous discharge of approximately 3 MG/day based on the observed percolation rates.

Wastewater is normally sent to only one pond at a time. In the event the flow capacity of one pond is exceeded, the total capacity of both ponds (5 MG/day) is available. The ponds are enclosed by an 8-ft high chain-link fence to restrict access.

Under the Comprehensive Environmental Response, Compensation, and Liability Act Record of Decision for Operable Unit 3-13 (DOE-ID 1999b), it was decided to discontinue discharging to the existing percolation ponds. On January 3, 2000, a WLAP application was submitted to IDEQ to construct and operate two new percolation ponds (BBWI 2000e). The IDEQ approved plans and specifications to construct the new ponds on May 18, 2000 (IDEQ 2000c). The new ponds are expected to be completed by December of 2003.

The WLAP for the existing percolation ponds expired on September 17, 2000. However, IDEQ granted an extension for continued coverage under the existing percolation pond WLAP on June 5, 2000 (IDEQ 2000b). The extension authorizes operation of the existing percolation ponds until December of 2003.

3.3 Status of Special Compliance Conditions

There are no special compliance conditions associated with this permit.

3.4 Effluent Monitoring Results

A 24-hour flow-proportional composite sample is collected monthly from the sample point located in CPP-797 and analyzed for parameters listed in Schedule B of the permit. Table 3-1 presents effluent water quality data for this reporting period (November 1999 through October 2000).

Wastewater discharged to the Percolation Ponds in 2000 is consistent with previous years. The permit does not specify concentration limits for effluent to the ponds; however, concentrations were compared to the applicable primary or secondary constituent standards (Idaho 1997). Yearly average effluent concentrations for all constituents met these standards, except total dissolved solids (TDS). The yearly average concentration for TDS (523 mg/L) was above the secondary constituent standard of 500 mg/L, but was lower than the 1999 permit year average and has continued to decrease since the permit was issued. The sodium yearly average concentration was slightly higher than that from the last permit year (120 mg/L versus 118 mg/L). Additionally, while the yearly chloride average concentration did not exceed the secondary constituent standard of 250 mg/L, both the August and September monthly concentrations were greater than 250 mg/L.

Table 3-1. Idaho Nuclear Technology and Engineering Center Percolation Pond effluent data.

Sample Month	November	December	January	February	March	April	May	June	July	August	September	October	
Sample Date	11/9/1999	12/7/1999	1/4/2000[a]	2/23/2000[a]	3/22/2000	4/11/2000	5/10/2000	6/28/2000	7/11/2000	8/22/2000	9/13/2000	10/17/2000[a]	Yearly Average[b]
TKN (mg/L)	0.25	0.15 U[c]	0.15 U	0.15 U	0.21 U	0.12 U	0.15	0.12 U	0.12 U	0.08 U	0.11	0.08 U	0.09
Cl (mg/L)	183	186	200	97	239	176	185	146	80	298	292	219	192
TDS (mg/L)	516	519	390	379	560	504	508	447	346	698	691	715	523
Na (mg/L)	133	110	91	100	137	138	144	101	79	137	139	136	120
NO_2N (mg-N/L)	0.020 U	0.020 U	0.020 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.040 U	0.004 U	0.004 U	0.005 U
NO_3N (mg-N/L)	0.99	0.89	0.91	0.94	0.88	0.87	0.78	0.75	0.80	0.83	0.88	0.91	0.87
As (mg/L)	0.0039 U	0.0042 U	0.0067	0.0042 U	0.0039 U	0.0039 U	0.0039 U	0.0038 U	0.0038 U	0.0051 U	0.0051 U	0.0051 U	0.0025
Cd (mg/L)	0.0004 U	0.0005 U	0.0005 U	0.0005 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0005 U	0.0005 U	0.0005 U	0.0002 U
Cr (mg/L)	0.0051	0.0052	0.0053	0.0041	0.0043	0.0036	0.0041	0.0059	0.0063	0.0043	0.0036	0.0042	0.0047
Hg (mg/L)	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0000 U	0.0022 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U
Se (mg/L)	0.0043 U	0.0032 U	0.0032 U	0.0032 U	0.0037 U	0.0037 U	0.0037 U	0.0041 U	0.0041 U	0.0047 U	0.0049	0.0047 U	0.0022
Ag (mg/L)	0.0012 U	0.0017 U	0.0017 U	0.0017 U	0.0013 U	0.0013 U	0.0013 U	0.0016 U	0.0016 U	0.0015 U	0.0015 U	0.0015 U	0.0007 U
F (mg/L)	0.24	0.20	0.21	0.22	0.21	0.23	0.21	0.20	0.22	0.22	0.19	0.23	0.21
Fe (mg/L)	0.0139 U	0.0174 U	0.0751	0.0146	0.0265	0.0103	0.0211 U	0.0139 U	0.0146 U	0.0088 U	0.0105 U	0.0129 U	0.0153
pH (composite)[d]	8.47	8.42	8.22	8.35	8.32	8.33	8.26	8.09	8.08	8.15	8.23	8.12	8.25
pH (grab)[e]	8.37	8.42	8.33	NA[f]	8.31	8.42	8.15	8.14	7.91	8.13	8.18	8.18	8.23
Mn (mg/L)	0.0009	0.0006	0.0007	0.0009	0.0010	0.0011	0.0011	0.0005	0.0005	0.0006 U	0.0007 U	0.0002 U	0.0007
Cu (mg/L)	0.0041	0.0059	0.0048	0.0070	0.0031	0.0030	0.0020	0.0017	0.0012	0.0016	0.0026	0.0032	0.0034
Al (mg/L)	0.0093 U	0.0082 U	0.0161 U	0.0264	0.0112	0.0106 U	0.0106 U	0.0078 U	0.0078 U	0.0113 U	0.0125 U	0.0119 U	0.0076

a. Multiple samples were taken during the month. The January results for chloride, fluoride, nitrite, and nitrate are from a sample collected on January 19, 2000. The February TKN result is from a sample collected on February 29, 2000. The February mercury and sodium results are from a sample collected on February 24, 2000. The October results are an average of duplicate samples collected on the same day.
b. Yearly average is determined from the average of the monthly values. ½ the detection limit was used in the yearly average calculations for those results reported as below the detection limit.
c. U flag indicates that the result was reported as below the detection limit. A U flagged yearly average indicates that all results used in the calculation were reported as below the detection limit.
d. pH result shown is from a 24-hour composite sample.
e. pH result shown is from a grab sample.
f. NA – Result was not available.

Chloride, TDS, and sodium concentrations in the effluent are primarily from the water softening and water treatment operations in CPP-606. In January 1998, a reverse osmosis unit was installed, and a demineralizer system was put into operation; both have reduced the amount of salt additions required for treated water. Decreasing trends exist for TDS, sodium, and chloride concentrations when considering all data since 1995, despite increases in both TDS and chloride at the end of the 2000 permit year (Figure 3-3). These decreases over time appear to be partially related to a decrease in salt usage at INTEC (Figure 3-4).

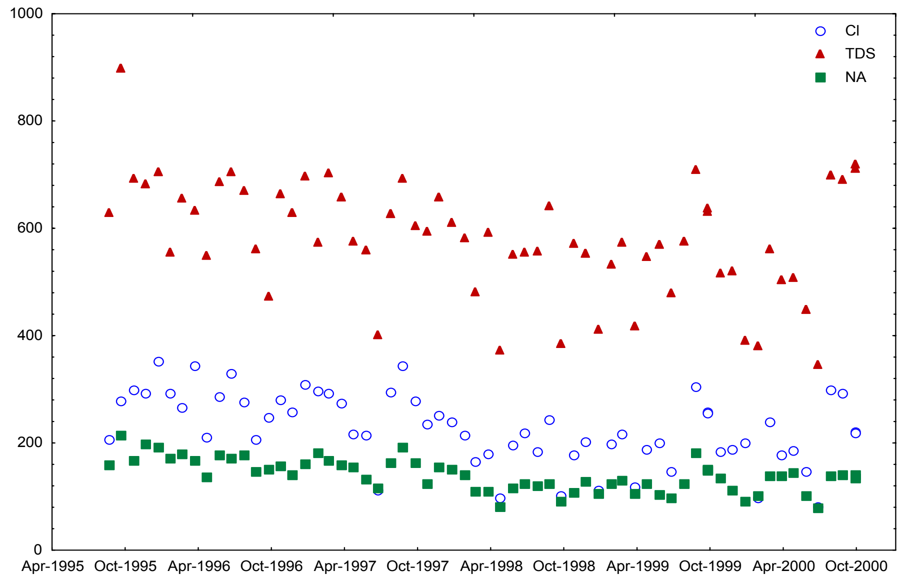


Figure 3-3. Percolation pond chloride, total dissolved solids, and sodium effluent data.

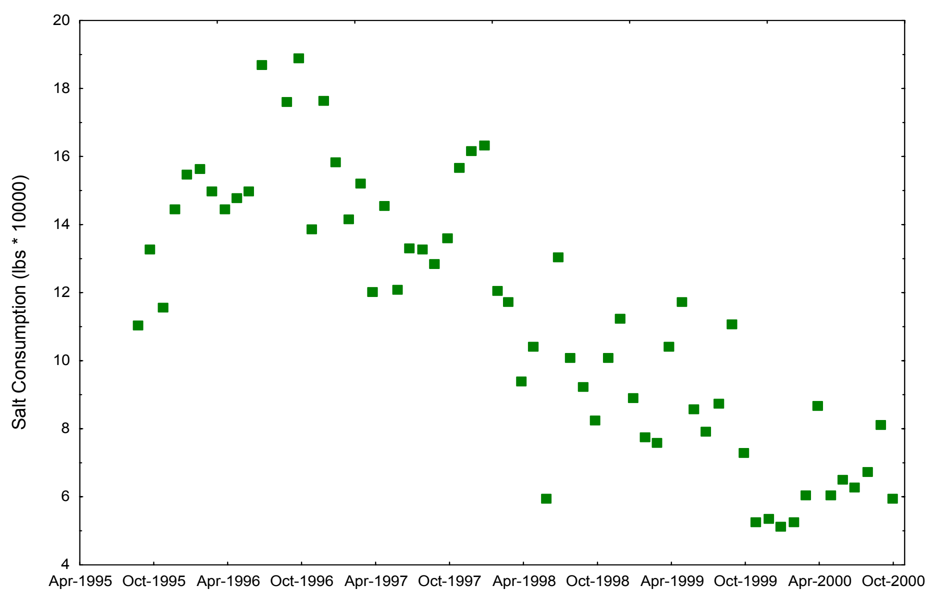


Figure 3-4. Idaho Nuclear Technology and Engineering Center monthly salt consumption.

The correlations over time between TDS and chloride (r = 0.83), sodium and chloride (r = 0.86), and TDS and sodium (r = 0.80) are fairly good. However, the correlations between salt usage and chloride (r = 0.52), salt usage and TDS (r = 0.40), and salt usage and sodium (r = 0.59) are weaker. It appears that salt usage continues to be only one of the factors in the decreased concentrations over time.

Table 3-1 presents pH results from both grab and composite samples. The permit requires that the pH result come from a composite sample. In addition, a verbal request was received from IDEQ for pH to be analyzed from a grab sample. Both results are provided in Table 3-1 to meet these requirements. The results varied slightly between the grab and composite samples over time. However, when a paired t-test was performed on the pH results from both the grab and composite samples from January 1997 through the 2000 permit year, no statistical difference was found between the two groups (grab vs. composite).

3.4.1 Flow Volumes

The flow volumes to the Percolation Ponds were recorded daily from the flow meter located in CPP-797. Table 3-2 presents monthly and total flow volumes, and Appendix B presents daily flow readings. For the reporting period, the total flow (387 MG) was discharged only into Percolation Pond No. 2 and was well below the permit limit of 912 MG/year. Total flow during the 2000 reporting period continues to be less than any of the previous permit reporting periods.

Table 3-2. Idaho Nuclear Technology and Engineering Center Percolation Pond flow summaries.

	Effluent (gpd)				
Time Period	Average	Maximum	Minimum	Pond 2 Total (MG)[a]	Total (MG)[a]
November 1999	779,713	1,138,700	499,800	23.39	23.39
December 1999	929,071	1,074,100	695,300	28.80	28.80
January 2000	995,987	1,440,900	864,100	30.88	30.88
February 2000	1,052,638	1,271,000	962,500	30.53	30.53
March 2000	1,092,823	1,351,300	921,900	33.88	33.88
April 2000	1,061,560	1,204,300	848,800	31.85	31.85
May 2000	1,006,516	1,113,200	880,300	31.20	31.20
June 2000	994,007	1,117,400	870,900	29.82	29.82
July 2000	1,135,877	1,385,000	1,019,000	35.21	35.21
August 2000	1,368,174	1,555,200	1,175,900	42.41	42.41
September 2000	1,271,547	1,447,300	1,103,300	38.15	38.15
October 2000	987,484	1,225,300	643,800	30.61	30.61
Overall	1,056,626	1,555,200	499,800	386.70	386.70

a. Monthly and annual totals are shown in million gallons (MG).

3.5 Groundwater Monitoring Results

In order to measure potential Percolation Pond impacts to groundwater, the permit requires that groundwater samples be collected from four monitoring wells (see Figure 3-5):

- One background aquifer well (USGS-121) upgradient of INTEC
- One aquifer well (USGS-048) immediately upgradient of the Percolation Ponds
- Two aquifer wells (USGS-112 and -113) downgradient of the Percolation Ponds, which serve as points of compliance.

Sampling must be conducted semiannually during April and October and must include a number of specified parameters for analysis. Contaminant concentrations in USGS-112 and -113 are now limited by primary constituent standards (PCSs) and secondary constituent standards (SCSs) specified in IDAPA 58.01.11, "Ground Water Quality Rule" (Idaho 1997). These standards replace the previous maximum allowable concentrations (MACs) and secondary maximum contaminant levels (SMCLs) specified in the groundwater quality standards (Idaho 1996b). Variances from these standards have been established for TDS and chloride, which have specified permit limits set at 800 mg/L and 350 mg/L, respectively.

During the 2000 reporting period, groundwater was sampled in April and October. Table 3-3 shows water levels (recorded prior to purging and sampling) and analytical results for all parameters specified by the permit. Analytical results are very similar to those of previous years; no permit levels were exceeded at either compliance well during the reporting period. Chloride, TDS, and sodium concentrations were elevated in USGS-112 and -113 compared to USGS-048. These elevated concentrations are the result of the continued operation of the water softening and treatment processes at INTEC, which introduce chloride, TDS, and sodium into the Service Waste System.

No significant trends were evident in chloride, TDS, or sodium concentrations in either USGS-112 or USGS-113, when considering all permit data through October 2000. This differs from that of the Percolation Pond effluent, where all three parameters have exhibited a decreasing trend since 1995 (refer to Figures 3-6, 3-7, and 3-8, respectively). TDS and chloride concentrations are expected to follow the trends exhibited by the effluent, but with lower concentrations due to mixing in the aquifer, and a time lag and dampening effect from the 450-ft thick vadose zone. The trends in the compliance wells will continue to be evaluated as more data become available.

3.6 Summary of Environmental Impacts

Annual flow volume to the INTEC Percolation Ponds and contaminant concentrations in the groundwater remained within limits established by the permit during the 2000 reporting period.

As in previous years, concentrations of TDS, chloride, and sodium were at elevated concentrations in the compliance wells (USGS-112 or USGS-113) compared to the background wells. These elevated concentrations are the result of water softening and treatment operations. No statistical trends are evident for any of the parameters at either compliance well, while decreasing trends exist for all three in the Percolation Pond effluent.

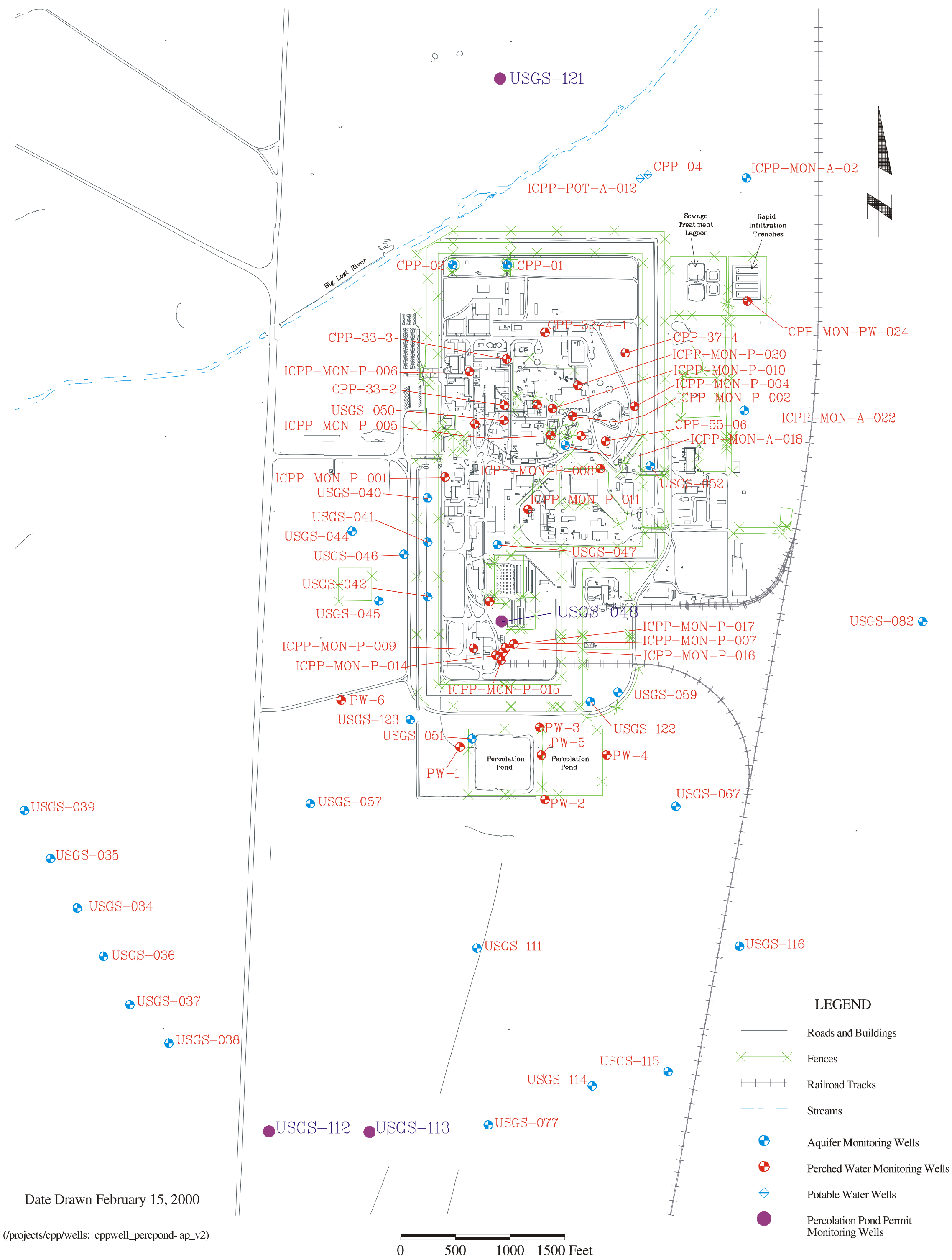


Figure 3-5. Locations of Idaho Nuclear Technology and Engineering Center monitoring wells.

Table 3-3. Idaho Nuclear Technology and Engineering Center Percolation Pond groundwater quality data for April and October 2000.

	USGS-048			USGS-121		USGS-112		USGS-113		PCS/SCS[b]
Depth to Water Table (ft)	456.49	456.49	459.58	452.81	454.78	468.58	475.75	474.14	476.28	
Sample Date	4/17/00	4/17/00[a]	10/10/00	4/19/00	10/3/00	4/17/00	10/3/00	4/18/00	10/3/00	
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
TKN	0.2 U[c]	0.2 U	0.326	0.2 U	0.340	1.37	0.269	0.210	0.256	NA[d]
Chloride	20.5	21.5	20.2	11.0	10.2	151	119	188	164	250 (350)[e]
TDS	274	288	308	261	301	488	471	560	612	500 (800)[e]
Sodium	9.98	9.92	10.3	7.07	6.91	64.8	58.1	88.5	80.8	NA
NO_3N	1.6	1.6	1.5	0.71	0.73	2.7	3.0	2.0	2.5	10
NO_2N	0.002 U	0.002 U	0.004 U	0.002 U	0.004 U	0.002 U	0.004 U	0.002 U	0.004 U	1
$NO_2N + NO_3N$	1.62	1.58	1.72	0.697	0.774	2.75	3.01	2.07	2.56	10
Arsenic	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.05
Cadmium	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.005
Chromium	0.0067	0.0068	0.0057	0.0035	0.0036	0.0052	0.0054	0.0055	0.0058	0.1
Mercury	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.002
Selenium	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.05
Silver	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.1
Fluoride	0.236	0.284	0.223	0.251	0.221	0.266	0.234	0.270	0.250	4
Iron	0.0472	0.0455	0.0125 U	0.0555	0.0679	0.0680	0.158	0.0100 U	0.0125 U	0.3
Manganese	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0037	0.0025 U	0.0025 U	0.05
Copper	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0057	0.0025 U	0.0025 U	1.3
Aluminum	0.0190	0.0155	0.0082	0.0197	0.0085	0.0146	0.0275	0.0096	0.0062	0.2
pH	7.79	7.79	NS[f]	7.83	7.80	7.73	7.74	7.83	7.76	6.5–8.5

a. Duplicate sample.

b. Primary constituent standards (PCSs) and secondary constituent standards (SCSs) in groundwater referenced in IDAPA 58.01.11.200.01.a and b. SCSs apply to chloride, TDS, silver, iron, manganese, aluminum, and pH.

c. U flag indicates that the result was reported as below the detection limit.

d. NA = not applicable.

e. The permit specifies exceptions for chloride and TDS limits of 350 mg/L and 800 mg/L, respectively.

f. Not sampled.

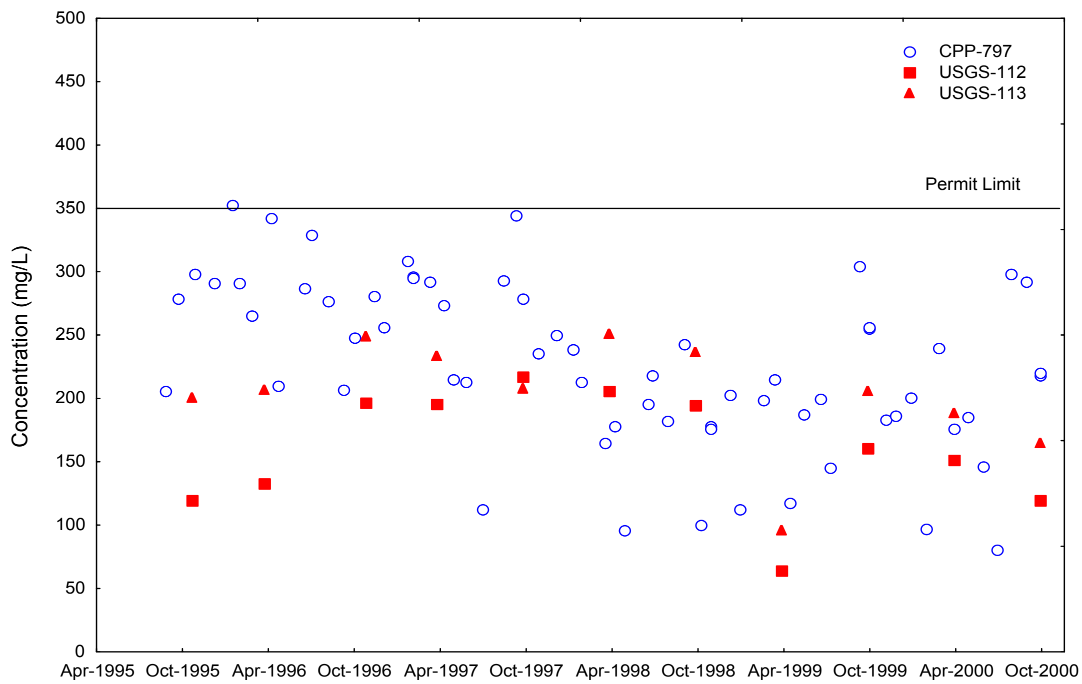


Figure 3-6. Chloride data from Idaho Nuclear Technology and Engineering Center Percolation Pond wells and effluent (CPP-797).

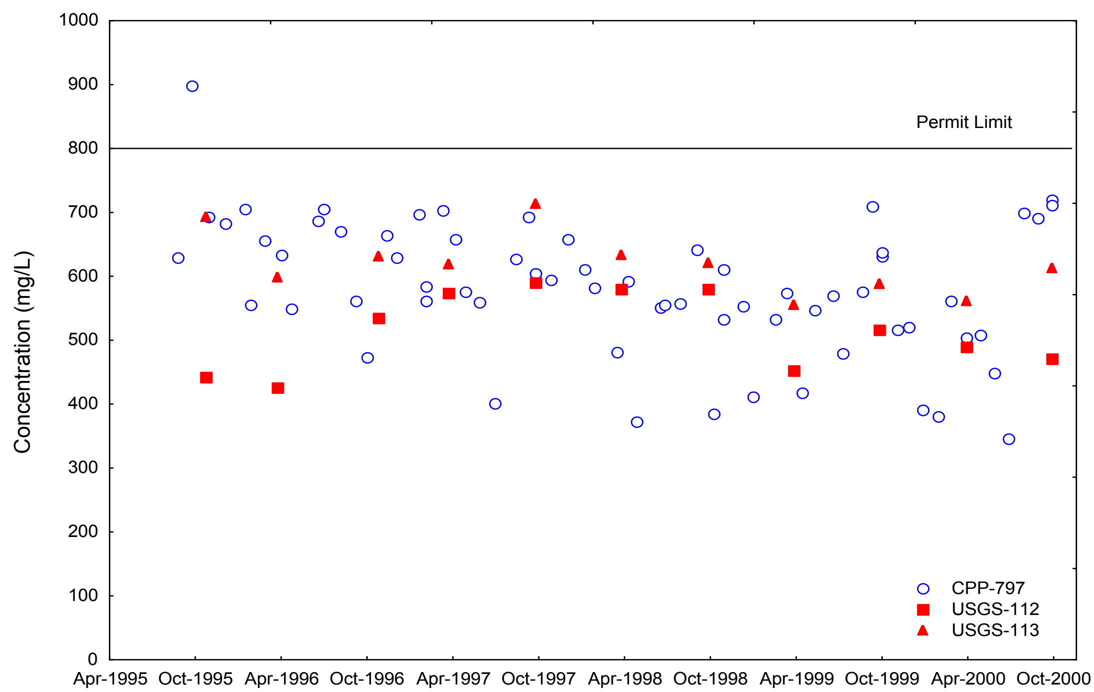


Figure 3-7. Total dissolved solids data from Idaho Nuclear Technology and Engineering Center Percolation Pond wells and effluent (CPP-797).

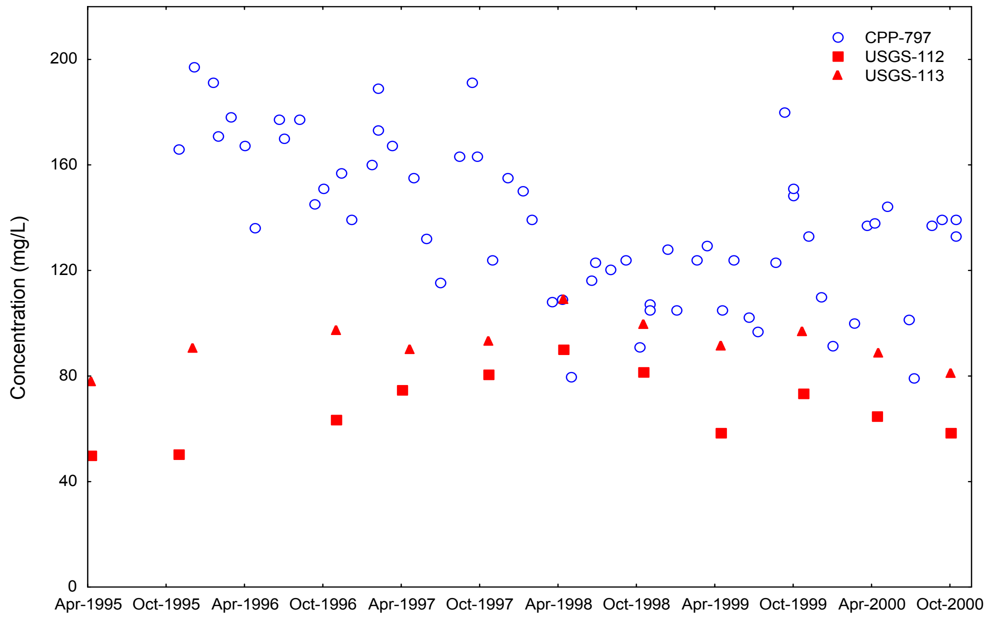


Figure 3-8. Sodium data from Idaho Nuclear Technology and Engineering Center Percolation Pond wells and effluent (CPP-797).

4. IDAHO NUCLEAR TECHNOLOGY AND ENGINEERING CENTER SEWAGE TREATMENT PLANT DATA SUMMARY AND ASSESSMENT

4.1 System Description and Operation

The STP is located on the east side of INTEC, outside the enclosed plant area. The STP treats and disposes of sanitary and other related wastes at INTEC. Approximately 31 permanent buildings within INTEC are connected to the STP. The sewage system consists of six lift stations. Each lift station has two pumps, with the exception of CPP-1713, which has only one. Four of the lift stations (CPP-768, CPP-1713, CPP-1772, and CPP-724) pump the waste into one of the two main lift stations (CPP-728). This main lift station and the eastside main lift station (CPP-733) both contain a sewage grinder that the wastewater passes through before being pumped to the STP. The INTEC STP (Figure 4-1) consists of:

- Two aerated lagoons
- Two quiescent, facultative stabilization lagoons
- Four rapid infiltration (RI) trenches
- Six control stations (weir boxes).

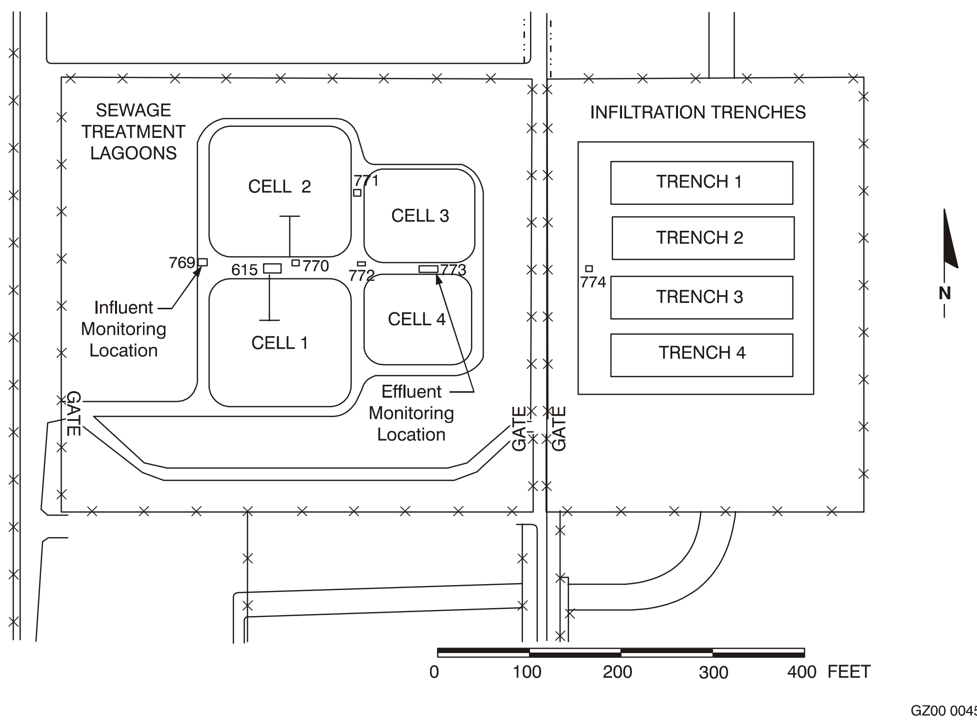


Figure 4-1. Idaho Nuclear Technology and Engineering Center Sewage Treatment Plant and rapid infiltration trenches.

The six control stations (CPP-769, CPP-770, CPP-771, CPP-772, CPP-773, and CPP-774) direct the wastewater flow to the proper sequence of lagoons and infiltration trenches. Automatic flow-proportional composite samplers are located in heated structures at control stations CPP-769 (influent) and CPP-773 (wastewater from the STP to the RI trenches). The composite samplers are connected to flow meters, thus allowing flow-proportional samples to be taken.

The influent wastewater is routed to aerated lagoon Cell No. 1. The sewage then passes from Cell No. 1 through control station CPP-770 to aerated lagoon Cell No. 2. From Cell No. 2, all flow is divided in control station CPP-771, where half goes to quiescent facultative lagoon Cell No. 3 and the other half to quiescent facultative lagoon Cell No. 4. This system depends on natural biological and physical processes (digestion, oxidation, photosynthesis, respiration, aeration, and evaporation) to treat the wastewater.

The STP was originally designed to treat a flow of 80,000 gallons per day (gpd). However, an influent flow of 40,000 gpd approximates the actual average influent flow for 1999 and 2000 reporting years. Lagoon Cell Nos. 1 and 2 each have a retention time of 11 days at the designed flow of 80,000 gpd and 22 days at 40,000 gpd. Lagoon Cell Nos. 3 and 4 each have a designed retention time of 4.5 days at the maximum flow of 80,000 gpd to each cell. Because the flow splits, with 20,000 gpd going to each cell, the calculated retention time for each cell is approximately 17 days.

In mid-June of this reporting year, the simultaneous operation of the two blowers that supply aeration to Cells No.1 and No. 2 began. As discussed in more detail in Section 4.2, the additional aeration from operating both blowers is expected to increase the removal of ammonia from the wastewater through the process of air stripping and thereby, reduce the concentration of total nitrogen in the effluent.

After treatment, the wastewater passes through control station CPP-773 to CPP-774 where it is then routed to one of four RI trenches. In March 1997, trench rotation frequency was increased from biweekly to weekly to maximize the nitrification/denitrification process in the soil beneath the RI trenches.

4.2 Status of Special Compliance Conditions

During the initial 2-year period following permit issuance, the permit limited maximum total nitrogen (TKN + NNN) to less than 40 mg/L monthly average, and less than 26 mg/L yearly average measured at the influent to the infiltration trenches. Within 2 years from permit issuance, the facility was required to meet the total nitrogen limit of 20 mg/L measured at the influent to the RI trenches (CPP-773, effluent) or submit a preliminary engineering report outlining modifications that would bring the facility into compliance. Because the total nitrogen limit of 20 mg/L had not been exceeded since permit issuance (September 20, 1995), it was agreed during a conference call on April 1, 1997 between IDEQ and Lockheed Martin Idaho Technologies Company (LMITCO) that an approved engineering plan was not required. However, in December 1997, the total nitrogen limit was exceeded for the first time. As required by the permit, written notification of the exceedance was provided to IDEQ within five working days. All subsequent exceedances have been reported in accordance with the permit requirements. During the 2000 reporting period, the total nitrogen limit, based on a monthly average, was exceeded three times. This is less than that of the 1999 reporting period, when the total nitrogen limit was exceeded eight times.

An engineering study and a corrective action plan were submitted to IDEQ on November 11, 1998 (LMITCO 1998), for review and approval. The majority of the maintenance and operational corrective actions identified in the corrective action plan have been completed.

The maintenance and operational corrective actions were aimed at bringing the existing STP up to maximum treatment capability by preventing short circuiting, increasing retention time, and improving the nitrification/denitrification process. Sample collection frequency was increased to evaluate the effectiveness of the corrective actions in reducing total nitrogen in the effluent (CPP-773, wastewater from the STP to the RI trenches).

Two items identified in the corrective action plan that were not completed prior to the start of the 2000 WLAP reporting year were the replacement of the shear gates and a waste stream evaluation. Replacing the shear gates is expected to improve control of the flow of wastewater throughout the STP and is planned for permit year 2001. The services of Cascade Earth Sciences, Ltd. (CES) were contracted to work with INEEL personnel to inventory INTEC's sanitary wastewater system during permit year 2000 (CES 2000). The primary objective was to locate sources of unauthorized industrial wastewater that could be contributing to the nitrogen exceedances.

Wastewater samples were collected from eight manholes and three pump stations located throughout INTEC. Sample locations were chosen to isolate buildings or series of buildings. The samples were analyzed in the field for pH and temperature. The samples were then submitted to an off-site laboratory for TKN, ammonia, and nitrate + nitrite analysis.

During the sampling activities, "cloudy" colored wastewater appeared to come in surges in the manhole that services buildings CPP-602/630. The pH of this wastewater was 9.0 and contained an elevated level of ammonia (55 mg/L). A report (CES 2000) in July 2000 recommended INEEL personnel obtain building plans, investigate chemical usage and disposal practices, and dye test process drains in buildings CPP-602/630. No other suspect areas were identified in the CES report.

INEEL personnel conducted a walk-down of CPP-602/630 and interviewed facility personnel but were unable to identify the source. There were no processes identified in CPP-602/630 that would generate wastewater containing nitrogen compounds. As-built drawings were reviewed. Dye tests were performed on drains where there was a concern with the accuracy of the drawings. No dye was detected in the sanitary sewage system, indicating that the drains in question did not discharge to the system.

In addition to the corrective actions completed to date, the effects of increased aeration are being evaluated. Two blowers aerate lagoon Cells No. 1 and 2. Normal operation is to run one blower at a time. Operation of both blowers simultaneously began in mid-June of this reporting year. Preliminary results from samples taken at control structure CPP-771 (effluent from lagoon Cell No. 2) indicate that the operating both blowers has increased ammonia removal. Use of the blowers will be discontinued during the shear gate replacement project. However, upon completion of the project, both blowers will again be operated simultaneously, and monitoring will continue throughout the remaining winter months.

Two surface aerators will be installed in Cell No. 3 in conjunction with the shear gate replacement. A test plan submitted to IDEQ on September 12, 2000 (BBWI 2000f), will be followed to determine the effectiveness of the aerators in stripping additional ammonia from the wastewater. Final conclusions of the test for reducing total nitrogen will be submitted to the IDEQ.

The original WLAP for the INTEC STP (IDEQ 1995a) expired on September 17, 2000. A renewal application was submitted during March 2000 (BBWI 2000a), but notification to continue to operate the STP was not received by the end of the permit year.

4.3 Influent and Effluent Monitoring Results

The permit sets effluent (CPP-773, wastewater from the STP to the RI trenches) limits for total nitrogen (TKN + NNN) and TSS and requires that the influent and effluent be sampled and analyzed monthly for several parameters. Influent samples were collected from control station CPP-769, and effluent samples were collected from control station CPP-773. The samples were analyzed for the parameters required by Schedule B of the permit. The data are summarized in Tables 4-1 and 4-2.

Table 4-1. Idaho Nuclear Technology and Engineering Center Sewage Treatment Plant influent data.

Sample Month	Sample Date	TKN (mg/L)	NNN (mg/L)	Total P (mg/L)	TSS (mg/L)	BOD (mg/L)
November	11/10/1999	30.10	0.098	1.74	149.0	96.4
December	12/14/1999	196.0	0.100 U[a]	9.80	308.0	275.0
January	01/04/2000	196.0	0.100 U	4.80	220.0	194.0
February	02/23/2000	23.00	0.299	4.09	89.0	76.0
March	03/22/2000	48.60	0.061	6.01	254.0	146.0
April	04/27/2000	51.00	0.010 U	7.33	31.4	145 R[b]
May	05/31/2000	61.10	0.036	10.40	1,250.0	184.0
June	06/14/2000	58.63[c]	0.030[c]	7.54	288.7[c]	169.0[c]
July	07/06/2000	47.10[c]	0.081[c]	7.25	91.3[c]	102.9[c]
August	08/02/2000	61.90[c]	0.012[c]	7.90	228.3[c]	172.3[c]
September	09/13/2000	46.45[c]	0.036[c]	4.07	506.0[c]	358.0[d]
October	10/12/2000	60.30	0.020 U	10.60	477.0	621.0
Yearly Average[e]		73.35	0.064	6.79	324.39	217.69

a. U flag indicates that the result was reported as below the detection limit. ½ the detection limit was used in average calculations for those results reported as below the detection limit.

b. R flag indicates that the result was rejected during data validation and is not included in any average calculations.

c. The result shown is the monthly average of all reported results for the month. Additional samples were taken on 6/21, 6/28, 7/19, 7/27, 8/22, 8/29, 9/21, and 9/27. The 9/21/2000 sample was rejected as not representative due to a compositor malfunction and excessive sediment being drawn into the sample. Therefore, none of the 9/21/2000 results are used in the average calculations.

d. The BOD result for 9/13/2000 was rejected during data validation. Therefore, the monthly result shown is the 9/27 reported concentration.

e. Yearly average is determined from the average of the monthly values. ½ the detection limit was used in the average calculation for those results reported as below the detection limit.

Table 4-2. Idaho Nuclear Technology and Engineering Center Sewage Treatment Plant effluent data.

Sample Month	Sample Date	TKN (mg/L)	NNN (mg/L)	BOD (mg/L)	TSS (mg/L)	Total P (mg/L)	EC (umhos/cm)	TDS (mg/L)	Cl (mg/L)	Total Coliform[a] (col/100 mL)
November	11/10/1999	13.80	3.54	15.40	20.00	1.64	765.4	462.0	97.0	3,500
December	12/14/1999	13.20	4.50	13.10U[b]	12.00	3.60	788.1	79.0	97.7	2,500
January	01/04/2000	21.30	3.30	11.40	4.00	4.00	890.7	496.0	103.0	6,000
February	02/23/2000	21.60	1.55	17.00	13.20	5.62	802.3	446.0	90.2	1,600
March	03/22/2000	16.50	0.870	27.00	26.00	3.35	401.0	304.0	61.8	800
April	04/27/2000	28.20	0.024	25.60	42.20	5.80	735.1	394.0	59.0	NA[c]
May	05/31/2000	8.85	0.482	5.79	53.40	4.00	558.4	394.0	70.5	240
June	06/14/2000	12.97[d]	0.187[d]	33.65[e]	92.47[d]	5.66	636.1[d]	473.0	79.5	260
July	07/06/2000	10.30[d]	0.066[d]	22.33[d]	43.80[d]	5.77	607.4[d]	467.0	83.5	450
August	08/02/2000	9.21[d]	0.933[d]	24.07[d]	26.87[d]	5.04	835.3[d]	512.0	96.5	305
September	09/13/2000	11.84[d]	1.87[d]	12.80[f]	58.10[d]	5.74	843.2[d]	598.0	98.0	140
October	10/12/2000	5.48[g]	3.51[g]	17.10[g]	19.90[g]	4.52[g]	825.1	573.0[g]	89.35[g]	600
Yearly Average[h]		14.44	1.74	17.22	34.33	4.56	723.3	433.17	85.50	1,490

a. Coliform samples were collected on 11/30/1999, 12/20/1999, 1/4/2000, 2/24/2000, 3/23/2000, 5/17/2000, 6/29/2000, 7/17/2000, 8/23/2000, 9/13/2000, and 10/19/2000.

b. U flag indicates that the result was reported as below the detection limit. ½ the detection limit was used in the average calculations for those results reported as below the detection limit.

c. A total coliform sample was not taken during April as the operators were performing leak tests on the ponds.

d. The result shown is a monthly average of all reported results for the month. Additional samples were taken on 6/21, 6/28, 7/19, 7/27, 8/22, 8/29, 9/21, and 9/27.

e. The 6/14 BOD result was rejected during data validation. The monthly result shown is an average of the remaining two results reported on 6/21 and 6/28.

f. The 9/13 BOD result was rejected during data validation. The monthly result shown is an average of the remaining two results reported on 9/21 and 9/27.

g. Duplicate samples were taken in October. The result shown represents an average of the duplicate results for this parameter.

h. Yearly average is determined from the average of the monthly values. ½ the detection limit was used in the average calculation for those results reported as below the detection limit.

Except for the monthly total coliform grab sample, all samples are to be collected as 24-hour flow-proportional composites. Flow-proportional composite samples were collected from the influent during the majority of the reporting period using a portable sampler due to a failure of the dedicated composite sampler during early 1999. The dedicated sampler was returned to service in August 2000.

Monthly average effluent concentrations of TSS remained below the monthly average limit of 100 mg/L, with an annual average of 34 mg/L. Individual measurements during June (187 mg/L) and September (124 mg/L) did not represent permit limit exceedances since the permit limit is applicable to a monthly average and multiple samples were taken during these months. During the 2000 reporting period, the total nitrogen limit based on a monthly average was exceeded three times. Nitrogen results are discussed further in Section 4.3.1

Most other permit-required parameters were within the range of concentrations observed in past reporting years. However, both influent and effluent BOD and TSS yearly averages were higher than past years. Based on the Mann-Kendall non-parametric test for trends, increasing trends over time were found for TSS and BOD concentrations in both the influent and effluent. Increases in the number of employees assigned to INTEC could contribute to the increase in TSS. However, the number of employees has decreased since 1995, and population levels do not appear to account for the increases.

An historically high concentration in the influent was reported for TSS in May (1,250 mg/L) relative to past concentrations ranging from 19 to 1,200 mg/L. Influent TKN concentrations for December 1999 and January 2000 were historical highs, and both were reported as 196.0 mg/L. While the reasons for these high influent TKN concentrations are not known, the concentrations decreased for the remainder of the year.

Table 4-3 summarizes calculated REs for total nitrogen, BOD, and TSS. As observed in previous years, BOD and TSS are treated more efficiently by a lagoon system than total nitrogen. For permit year 2000, higher REs were calculated for total nitrogen than in the past, with the exception of February where the total nitrogen calculated for the influent and effluent were nearly equal. The average total nitrogen RE for the STP was 67%, while the average RE for both BOD and TSS was 85%.

Table 4-3. Removal efficiency[a] for permit monitoring parameters at the Idaho Nuclear Technology and Engineering Center Sewage Treatment Plant.

Sample Month	Total Nitrogen[b] (%)	BOD (%)	TSS (%)
November 1999	43	84	87
December 1999	91[c]	98[d]	96
January 2000	87	94	98
February 2000	1	78	85
March 2000	64	82	90
April 2000	45[c]	NC[e]	NC
May 2000	85	97	96
June 2000[f]	78[c]	82[g]	66
July 2000[f]	76	44	63
August 2000[f]	84[c]	86	85
September 2000[f]	66	96[g]	75
October 2000	85[c]	97	96
Overall Average	67	85	85

a. Removal efficiency (RE) [(influent concentration – effluent concentration) ÷ influent concentration)] × 100.

b. Total nitrogen includes NNN and TKN.

c. ½ the detection limit was used in the influent NNN component of the total nitrogen value since the result was reported as below the detection limit.

d. ½ the detection limit was used in the RE calculation for the effluent concentration since the result was reported as below the detection limit.

e. NC – not calculated. For April BOD, the influent concentration was rejected during data validation and therefore could not be used in the calculation. For April TSS, the effluent concentration was greater than the influent concentration.

f. Multiple samples were taken during the month. The RE shown is an average based on all usable data for the month.

g. The 6/14 and 9/21 effluent BOD and the 9/13 and 9/21 influent and effluent BOD results were rejected during data validation. The RE shown is an average based on the REs calculated from the 6/21 and 6/28 results for June and the 9/21 and 9/27 results for September.

4.3.1 Wastewater Nitrogen Concentrations

Total nitrogen concentrations in the effluent (CPP-773, wastewater from the STP to the RI trenches) exceeded the permit limit for the first time in December 1997. The permit limit was exceeded again in February, March, and August 1998. During the 1999 permit year, monthly average total nitrogen concentrations exceeded the permit limit eight times. During the 2000 reporting period, total nitrogen concentration exceeded the permit limit three times (Figure 4-2). Although elevated total nitrogen concentrations have occurred during warmer months, the highest concentrations have typically occurred during colder months, when biological activity of microorganisms decreases from the colder temperatures.

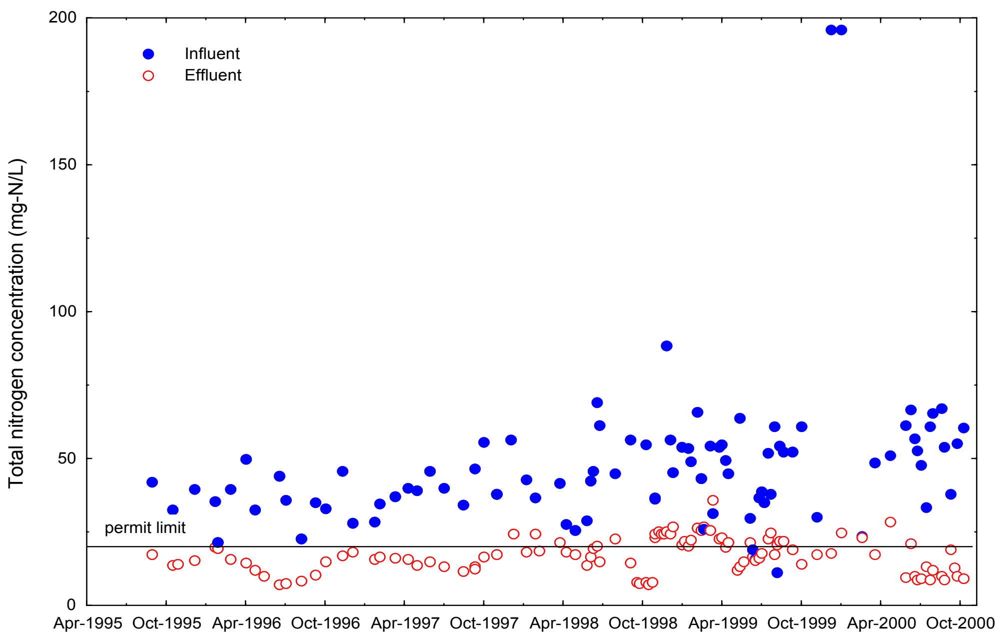


Figure 4-2. Idaho Nuclear Technology and Engineering Center Sewage Treatment Plant total nitrogen concentrations.

To gain a better understanding of what processes were occurring to remove nitrogen during treatment of the wastewater, additional monthly samples for nitrogen were collected (more than required by the permit) beginning in June 1998. The additional samples were collected from the influent (CPP-769), CPP-771 (effluent from Cell No. 2), and effluent (CPP-773, wastewater from the STP to the RI trenches) and analyzed for TKN, nitrite + nitrate (NNN), and ammonia (NH_3N).

From the sample results (Table 4-4), it was determined that as the wastewater enters the lagoon system, it is mainly composed of TKN. The majority of the TKN is in the form of ammonia. The aerators in lagoon Cell Nos. 1 and 2 remove the ammonia through the process of air stripping.

Table 4-4. Idaho Nuclear Technology and Engineering Center wastewater nitrogen concentrations by permit year.[a]

	CPP-769			CPP-771			CPP-773		
	1998	1999	2000	1998	1999	2000	1998	1999	2000
Parameter	Average (mg/L)			Average (mg/L)			Average (mg/L)		
NH_3N	35.2	35.9	39.8	14.86	20.32	13.1	12.75	16.2	11.9
NNN	0.065	0.125	0.064	0.05	1.117	3.232	1.104	1.298	1.736
TKN	44.1	48.2	73.3	16.5	23.2	16.1	16.3	19.7	14.4
Total Nitrogen	44.3	48.3	73.4	17.4	24.3	19.3	17.48	21	16.2

a. Permit year average concentrations are based on monthly averages from November through October.

Comparing the nitrogen concentrations from CPP-771 with the concentrations from the effluent shows little additional nitrogen removal is taking place in lagoon Cell Nos. 3 and 4. The majority of the total nitrogen in these two cells is still in the form of ammonia.

Annual average influent total nitrogen has been steadily increasing from 35.6 mg/L in 1996 to 48.9 mg/L in 1999. In 2000, the average influent total nitrogen increased to 73.4 mg/L. This increase in the average total nitrogen concentration compared to 1999 was caused by two exceptionally high TKN values in December 1999 and January 2000.

Total nitrogen in the effluent continued to increase from an annual average of 13.1 mg/L in 1996 to 21 mg/L in 1999. Then for 2000, the average total nitrogen decreased to 16.2 mg/L. As discussed in Section 4.1, the increased aeration initiated in June 2000 is expected to reduce the concentration of total nitrogen in the effluent. The reduction in average total nitrogen for the 2000 permit year could be the result of the increased aeration or the result of other measures already implemented to address the nitrogen concentrations (i.e., bacterial reseeding performed in 1999). Further actions (discussed in Section 4.2) are planned in an attempt to reduce the total nitrogen concentrations.

4.3.2 Flow Volumes

Influent flow is measured by two ultrasonic, dual transducer, clamp-on-design flow meters attached to the force main lines coming from final lift stations CPP-728 and CPP-733. These flow meters are located just prior to the CPP-769 (influent to the STP) control structure. The effluent (CPP-773, wastewater from the STP to the RI trenches) flow meter consists of an ultrasonic level sensor and a V-notch weir plate. The two influent flow meters and the effluent flow meter provide continuous flow data. Daily flow readings are taken and recorded in gpd. Table 4-5 summarizes monthly and total flow volume, and Appendix C presents daily flow readings.

Beginning March 17, 1997, the rotation frequency of the infiltration trenches was changed from 2 weeks to 1 week. This increased rotation frequency allowed greater soil wetting and drying in an effort to maximize nitrogen removal. Table 4-6 summarizes the monthly flow to each trench.

Table 4-5. Idaho Nuclear Technology and Engineering Center Sewage Treatment Plant flow summaries.

Sample Month	Influent Average (gpd)	Influent Minimum (gpd)	Influent Maximum (gpd)	Influent Total (MG)[a]	Effluent Average (gal)	Effluent Minimum (gal)	Effluent Maximum (gal)	Effluent Total (MG)[a]
November 1999	45,776	33,207	78,719	1.37	24,388	8,433	49,293	0.73
December 1999	44,170	31,388	64,145	1.37	18,348	8,178	31,400	0.57
January 2000	53,309	38,196	78,475	1.65	29,489	15,784	50,948	0.91
February 2000	52,550	34,655	94,767	1.52	34,614	16,702	80,559	1.00
March 2000	46,732	33,311	61,876	1.45	24,446	11,512	40,690	0.76
April 2000	41,884	26,583	62,517	1.26	4,303	16	23,461	0.13
May 2000	40,261	14,338	75,189	1.25	10,086	131	34,070	0.31
June 2000	32,715	17,547	61,731	0.98	10,978	180	20,337	0.33
July 2000	30,072	12,579	82,859	0.93	12,270	36	58,632	0.38
August 2000	33,943	15,366	51,203	1.05	12,118	172	26,995	0.38
September 2000	31,109	17,020	48,452	0.93	13,016	1,746	26,234	0.39
October 2000	30,809	16,789	70,984	0.96	15,773	1,783	54,620	0.49
Overall	40,237	12,579	94,767	14.73	17,439	16	80,559	6.38

a. Monthly and annual permit totals are shown in million gallons (MG).

Total annual effluent flow to the trenches was 6.38 MG during the 2000 reporting year, which is well below the permit limit of 30 MG/year. Table 4-5 shows that the significant disparity between the measured influent and effluent values (identified in 1997) continued during the 2000 reporting period. To address the disparity, an engineering evaluation of the flow meters was performed in 1997. This evaluation identified several problems with the influent and effluent flow meters that could be corrected to improve accuracy. The evaluation also recommended that if these corrections were not effective, the influent flow meter system should be redesigned and replaced, which they were.

The work to improve the accuracy of the flow meters began in 1997 and continued during the 2000 permit year. However, the disparity between the influent and effluent flows continues. The influent flow meter in CPP-769 was replaced in 1998 with a different type of metering system; specifically, an ultrasonic, dual transducer, clamp-on design flow meter. During 2000, both the influent and effluent flow meters were recalibrated, and a study was performed that looked at possible causes for the flow disparity.

Table 4-6. Monthly flow to each trench.

Sample Month	Trench 1 (MU-011501) (MG)	Trench 2 (MU-011502) (MG)	Trench 3 (MU-011503) (MG)	Trench 4 (MU-011504) (MG)
November 1999	0.23	0.13	0.12	0.25
December 1999	0.24	0.21	0.00	0.12
January 2000	0.22	0.29	0.21	0.19
February 2000	0.28	0.23	0.26	0.24
March 2000	0.15	0.14	0.27	0.20
April 2000	NF[a]	NF	0.10	0.02
May 2000	0.12	0.09	0.02	0.08
June 2000	0.14	0.08	NF	0.10
July 2000	0.25	0.08	NF	0.05
August 2000	0.23	0.05	NF	0.10
September 2000	0.10	0.14	NF	0.16
October 2000	0.19	0.20	NF	0.11
Overall	2.15	1.63	0.98	1.63

a. NF = no flow.

In addition to monitoring the flow meters' accuracy, leak tests began in 1998 to ensure that the integrity of the lagoon liners has not been compromised. The leak test for lagoon Cell Nos. 1 and 2 were performed in permit year 1999 and showed that the integrity of the liner was intact and that the cells were not leaking. Leak tests for Cell Nos. 3 and 4 were completed in May 2000 and continued to show that the integrity of the liner was intact and that the cells were not leaking.

The influent and effluent flows will continue to be monitored, and further flow meter studies are planned for permit year 2001.

4.4 Groundwater Monitoring Results

In order to measure potential STP impacts to groundwater, the permit requires that groundwater samples be collected from three monitoring wells (see Figure 4-3):

- One background aquifer well (USGS-121) upgradient of INTEC
- One perched water well (ICPP-MON-PW-024) immediately adjacent to the STP
- One aquifer well (USGS-052) downgradient of the STP, which serves as the point of compliance.

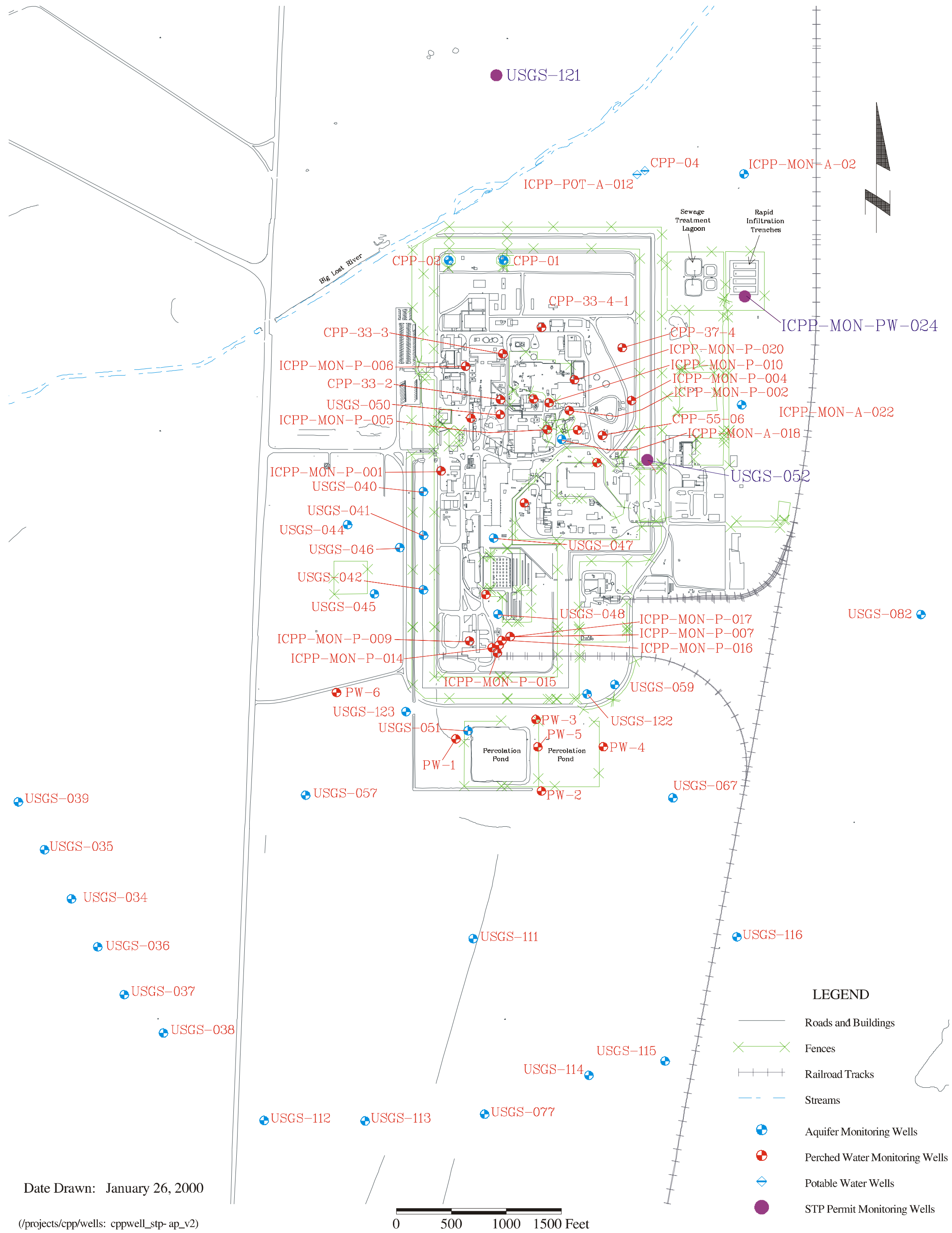


Figure 4-3. Locations of Idaho Nuclear Technology and Engineering Center Sewage Treatment Plant permit monitoring wells.

Sampling must be conducted semiannually and must include a list of specified parameters for analysis. Contaminant concentrations in USGS-052 are now limited by primary constituent standards and secondary constituent standards specified in IDAPA 58.01.11, “Ground Water Quality Rule" (Idaho 1997). These standards replace the previous maximum allowable concentrations (MACs) and secondary maximum contaminant levels (SMCLs) specified in the groundwater quality standards (Idaho 1996b).

During the 2000 reporting period, groundwater sampling was conducted in April and October. Table 4-7 shows water levels (collected prior to purging and sampling) and analytical results for all parameters required by the permit. Groundwater samples collected from USGS-052 were in compliance with all permit limits during 2000. Chloride and nitrate concentrations in USGS-052 were elevated compared to USGS-121, which is similar to that observed in 1999 and previous years. TDS concentrations in USGS-121 were higher than in 1999 and only slightly lower than the concentrations in USGS-052.

Monitoring well ICPP-MON-PW-024 was constructed in the perched water zone approximately 70 ft below the surface of the infiltration trenches. It is used as an indicator of treatment efficiency of the soil, rather than serving as a point of compliance. Similar to previous years, TDS and chloride concentrations in ICPP-MON-PW-024 approximated those of the effluent. During 2000, total coliform was absent in ICPP-MON-PW-024, but was present in the effluent. Total nitrogen concentrations (comprised of NO_2N, NO_3N, and TKN) in the perched water closely followed those of the effluent prior to 1997 (Figure 4-4), the difference being that nearly all the total nitrogen in the perched water was comprised of NO_3N, while the primary component in the effluent was NH_3N. This suggests significant nitrification (a process whereby NH_3N is converted to NO_3N) by the soil, but little denitrification to a gas. In March 1997, the trench rotation frequency was increased from biweekly to weekly to increase denitrification in the soil column. Total nitrogen concentrations in the perched water appear to be reduced compared to the effluent and are at concentrations between that of the effluent and that measured at USGS-052. It appears, however, that this reduction actually began in December 1996, just before the trench rotation frequency was increased. This fact, coupled with a smaller number of perched water data points, makes it difficult to quantify the relationship between trench rotation and denitrification. As a result, weekly trench rotation will continue, and contaminant trends will continue to be observed and tracked.

4.5 Summary of Environmental Impacts

INTEC STP effluent flow volumes, effluent TSS, and groundwater concentrations were all within permit limits. Total nitrogen concentrations in the effluent exceeded the permit limit (20 mg/L) 3 months during the 2000 reporting period. However, the yearly average concentration decreased from the 1999 yearly average. Maintenance and operational corrective actions are underway and will be evaluated to determine their effectiveness in reducing nitrogen concentrations.

Concentrations of chloride, TKN, TDS, nitrate, ammonia, and total phosphorus were elevated in the perched water well at INTEC STP compared to background concentrations. Concentrations for the same constituents in the aquifer were only slightly elevated or indistinguishable from background when measured at the compliance well, suggesting that the groundwater impacts from the STP were negligible.

Table 4-7. Idaho Nuclear Technology and Engineering Center Sewage Treatment Plant groundwater quality data for April and October 2000.

	USGS-052				ICPP-MON-PW-024		USGS-121		PCS/SCS[b]
Depth to Water Table (ft)	451.42	451.42	453.55	453.55	62.64	61.25	452.81	454.78	
Sample Date	4/18/00 (mg/L)	4/18/00[a] (mg/L)	10/10/00 (mg/L)	10/10/00 (mg/L)	4/19/00 (mg/L)	10/3/00 (mg/L)	4/19/00 (mg/L)	10/3/00 (mg/L)	(mg/L)
TKN	0.2 U[c]	0.203	0.1 U	0.1 U	0.403	0.637	0.2 U	0.340	NA[d]
Chloride	23.5	23.0	23.2	23.2	90.0	83.7	11.0	10.2	250
TDS	311	282	309	320	573	588	261	301	500
NO_3N	1.7	1.8	2.5	2.5	16.3	11.5[e]	0.71	0.73	10
NO_2N	0.002 U	0.002 U	0.004 U	0.004 U	0.02 U	0.004 U	0.002 U	0.004 U	1
$NO_2N + NO_3N$	1.73	1.74	2.87	2.86	16.7	7.34	0.697	0.774	10
NH_4N	0.01 U	0.01 U	0.01 U	0.01 U	0.0167	0.0128	0.01 U	0.01 U	NA
BOD	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U R[f]	2.0 U	2.0 U R	NA
Total P	0.0202	0.0186	0.0266	0.0546	1.78	2.18	0.0174	0.0203	NA
Total Coliform	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	1 col/100 mL
Fecal Coliform	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	NA

a. Duplicate sample.

b. Primary constituent standards (PCSs) and secondary constituent standards (SCSs) in groundwater referenced in IDAPA 58.01.11.200.01.a and b. SCSs apply to chloride and TDS.

c. U flag indicates that the result was reported as below the detection limit.

d. NA = Not applicable.

e. Serial dilution percentage was slightly greater than the 10% limit.

f. R flag indicates that the result was rejected during data validation.

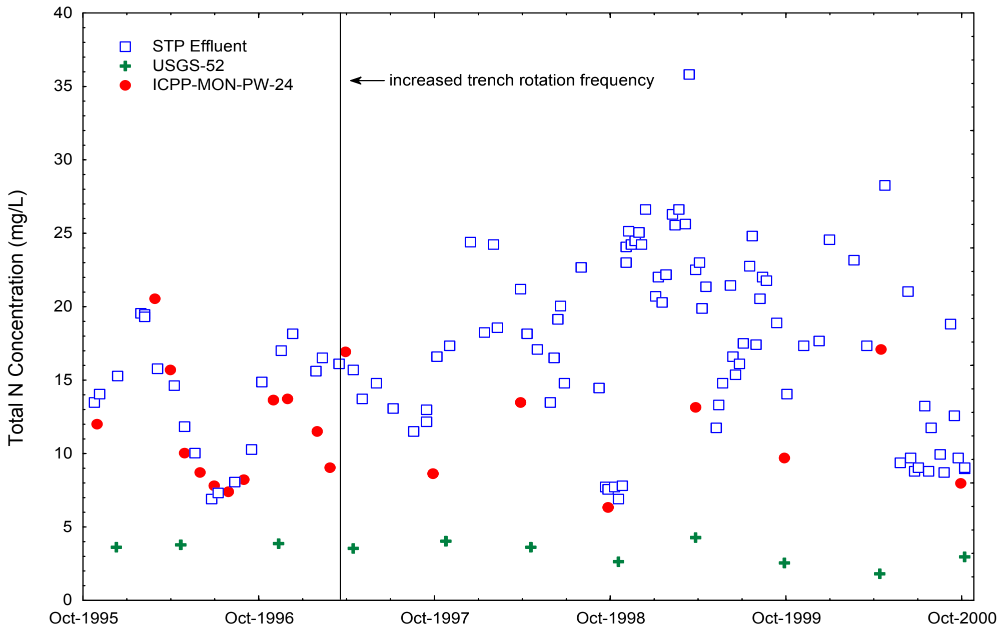


Figure 4-4. Total nitrogen concentrations in Sewage Treatment Plant effluent, ICPP-MON-PW-024, and USGS-052.

5. TEST AREA NORTH/TECHNICAL SUPPORT FACILITY SEWAGE TREATMENT PLANT DATA SUMMARY AND ASSESSMENT

5.1 Site Description

The Test Area North (TAN) is located at the north end of the INEEL. Major facilities at TAN include:

- Technical Support Facility (TSF)
- Containment Test Facility (formerly the Loss-of-Fluid-Test Facility)
- Specific Manufacturing Capability Facilities
- Water Reactor Research Test Facility
- Initial Engine Test Facility.

TAN was initially built between 1954 and 1961 to support the Aircraft Nuclear Propulsion Program sponsored by the U.S. Air Force and the Atomic Energy Commission.

The TSF area currently has approximately 40 buildings and a work force of about 180 people. The TAN/TSF STP only serves the buildings in the TSF area. The TAN/TSF STP and Disposal Pond are located southwest of the TSF area and over 1,500 ft away from the nearest drinking water well. A public road passes approximately ¼ mi southeast of the plant, and the nearest inhabited building is approximately 1,000 ft from the wastewater application area (Figure 5-1). Groundwater flows to the southeast.

5.2 System Description and Operation

The TAN/TSF STP was constructed in 1956. It was designed to treat raw wastewater by biologically digesting the majority of the organic waste and other major contaminants, then applying it to land for infiltration and evaporation. The STP consists of:

- Sewage collection manhole
- Imhoff tank
- Sludge drying beds
- Trickle filter and settling tank
- Contact basin
- Infiltration disposal pond.

The TAN/TSF Disposal Pond was constructed in 1971; prior to that, treated wastewater was disposed through an injection well.

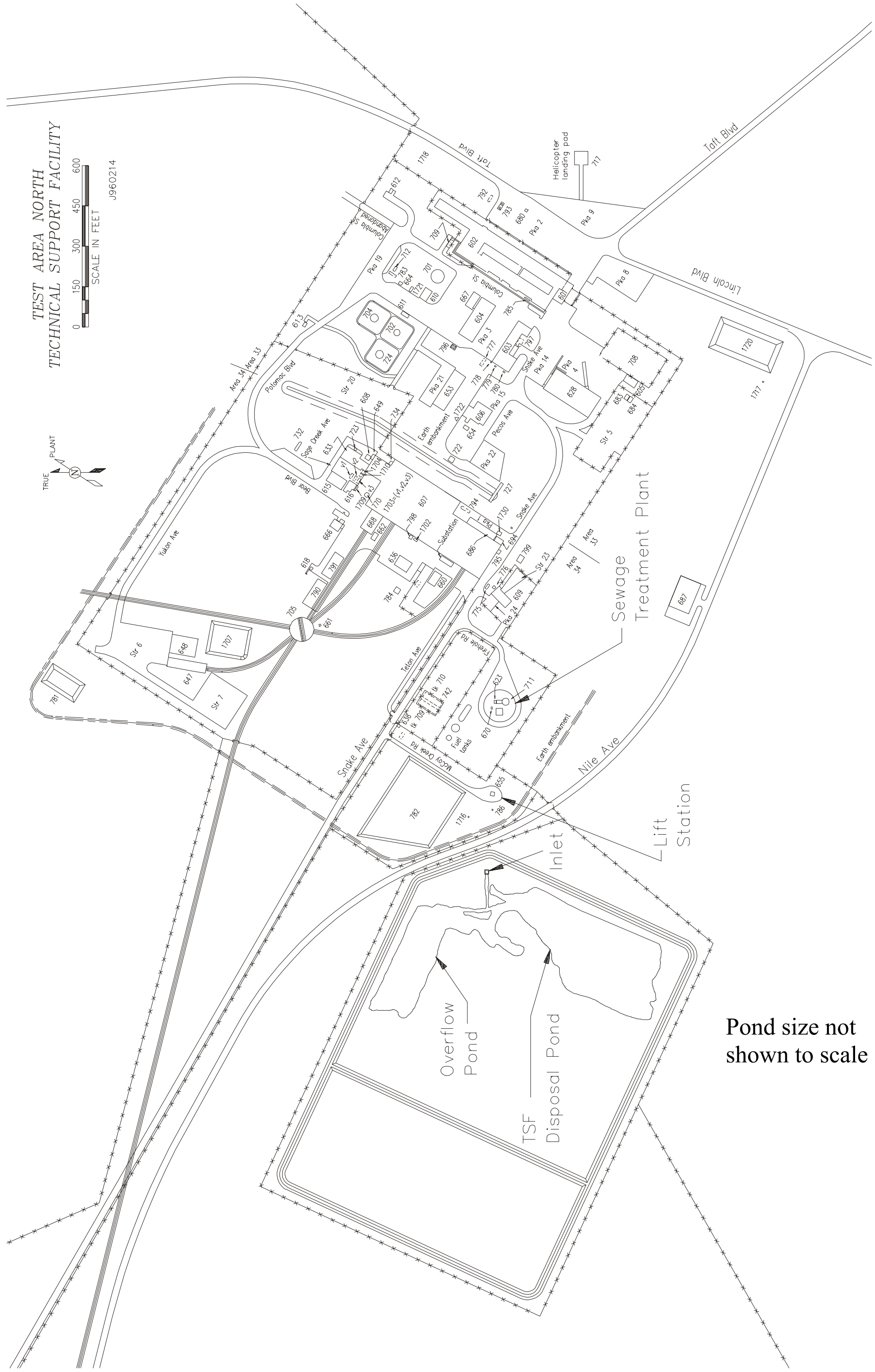


Figure 5-1. Test Area North/Technical Support Facility Sewage Treatment Plant and Wastewater Disposal Pond.

The Disposal Pond consists of a primary disposal area and an overflow section, both of which are located within an unlined, fenced 35-acre area. The overflow pond is rarely used; it is used only when the water is diverted to it for brief periods of cleanup and maintenance. The Disposal Pond and overflow pond areas are approximately 39,000 ft^2 (0.9 acres) and 14,400 ft^2 (0.330 acres), respectively, for a combined area of approximately 53,400 ft^2 (1.23 acres). In addition to receiving treated sewage wastewater, the pond also receives process wastewater, which enters the facility at the TAN-655 lift station.

The TSF sewage consists primarily of spent water containing wastes from rest rooms, sinks, and showers. The wastewater goes to the TAN-623 STP, and then to the TAN-655 lift station, which pumps to the Disposal Pond.

The process drain system collects wastewater from process drains and building sources originating from various TAN facilities. The process wastewater consists of effluent, such as steam condensate; water softener and demineralizer discharges; and cooling water, heating, ventilating, air conditioning, and air scrubber discharges. The process wastewater is transported directly to the TAN-655 lift station, where it is mixed with treated sanitary wastewater before being pumped to the Disposal Pond.

Designed output of the STP is 28,800 gpd, but can go up to 36,000 gpd, if necessary. During the 2000 reporting period, influent flow to the STP averaged less than 6,400 gpd and was down from the 1999 average of about 10,000 gpd. The TAN-655 lift station has a capacity of about 800 gallons per minute, well over 1 million gpd. The pond's capacity, taking into consideration volume losses from evaporation and infiltration, is estimated at 33 MG/yr (Kaminsky et al. 1993). Effluent flow to the pond was 9.61 MG during 2000.

There were few operational anomalies during the reporting period. Sludge was drawn from the Imhoff tank twice, once in May and once in September. Two electrical outages affected the STP; measures to prevent by-pass situations were taken during both of them.

5.3 Status of Special Compliance Conditions

No special compliance conditions were in effect during the reporting period.

5.4 Effluent Monitoring Results

The permit for the TAN/TSF STP sets concentration limits for TSS and total nitrogen (measured at the effluent to the Disposal Pond) and requires that the effluent be sampled and analyzed monthly for several parameters. During the 2000 reporting period, 24-hour composite samples (except total coliform, which was a grab sample) were collected at the TAN-655 lift station effluent monthly. The permit requires that monthly samples be collected as 24-hour, flow-proportional composites. However, due to the configuration of the piping and location of the flow meter, a compositor could not be installed that collects flow-proportional samples based on real-time measurement of the two incoming waste streams. As a result, an annual flow study was implemented starting in 1997 to determine the average fluctuations in flow over a 24-hour period. The flow study is repeated every year, and the compositor is reprogrammed based on the average flows observed during different periods of the day to simulate a flow-proportional sample for the year. This method has been used to collect time-weighted, flow-proportional samples since August 1997. The IDEQ verbally authorized this method of flow-proportional sampling, and written approval is pending.

Table 5-1 shows the effluent monitoring results for the 2000 reporting period. Monthly concentrations of TSS were below the permit limits (100 mg/L) throughout the entire reporting period

Table 5-1. Test Area North/Technical Support Facility water quality data for effluent to the TAN/TSF Disposal Pond.

	November	December	January	February	March	April	May	June	July	August	September	October	Yearly
Sample Date	11/17/1999	12/8/1999	1/12/2000	2/16/2000	3/29/2000	4/12/2000	5/4/2000	6/7/2000	7/27/2000	8/10/2000	9/21/2000	10/17/2000	Average[a]
Parameter (units)													
TKN (mg/L)	4.89 R[b]	4.20	7.30	8.99[c]	13.00	9.84	6.46[c]	3.82	3.71	2.82	7.60	2.95[c]	6.43
NH_3N (mg/L)	2.88	9.00	5.60	7.21[c]	10.70	8.50	6.46[c]	3.17	2.61	1.72	5.74	2.70[c]	5.52
NNN (mg/L)	6.35	8.50	8.20	6.63[c]	6.71	5.87	5.14[c]	7.08	6.02	6.03	6.64	5.75[c]	6.58
BOD (mg/L)	5.90	7.00	8.40	17.50[c]	15.00	15.50	28.00	17.10	15.10	13.60	18.00	16.20[c]	14.78
Total P (mg/L)	1.31	1.00	0.98	2.62[c]	1.98	1.82	1.95	1.60	1.23	0.998	1.61	3.12[c]	1.68
Total Coliform (col/100 mL)[d]	17,800	19,667	13,667	2,800	16,000	40,000	106,000	33,000	120,000	70,000	166,000	138,000	61,911
Fecal Coliform (col/100 mL)[d]	700.0	2,000	2,400	450.0	6,000	12,000	37,000	25,000	51,000	21,000	50,500	27,500	19,629
Cl (mg/L)	453.0	130.0	352.0	498.0[c]	423.0	379.0	33.00	22.50	21.40	64.50	100.00	88.60[c]	213.8
As (mg/L)	0.0027	0.0030 U[e]	0.0100 U	0.200 U[c]	0.200 U	0.0025 U	0.0027	0.0057	0.0032	0.0039	0.0025 U	0.0025 U[c]	0.019
Ba (mg/L)	0.085	0.092	0.116	0.126[c]	0.109	0.102	0.093	0.096	0.105	0.102	0.098	0.096	0.102
Cr (mg/L)	0.0022 U	0.0019	0.005 U	0.020 U[c]	0.020 U	0.0025 U	0.0025 U	0.0025 U	0.0038	0.0025 U	0.0025 U	0.0025 U[c]	0.0031
F (mg/L)	0.242	0.300	0.200	0.305[c]	0.293	0.295	0.475	0.332	0.314	0.337	0.272	0.216[c]	0.298
Pb (mg/L)	0.0071	0.0020 U	0.003 U	0.100 U[c]	0.100 U	0.0017	0.0015 U	0.0015 U	0.0050 U	0.0050 U	0.0015 U	0.0015 U[c]	0.0099
Fe (mg/L)	0.146	0.090	0.263	0.877[c]	0.116	0.088	0.118	0.057	0.619	0.039	0.024	0.096[c]	0.211
Mn (mg/L)	0.0089	0.0049	0.010	0.020[c]	0.012	0.013	0.011	0.0073	0.017	0.0058	0.0077	0.0072[c]	0.010
Hg (mg/L)	0.0002 U	0.0001 U	0.0002 U	0.0002 U[c]	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U[c]	0.0001 U
Se (mg/L)	0.0011 U	0.004 U	0.005 U	0.200 U[c]	0.200 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U[c]	0.018 U
Na (mg/L)	270.0	110.0	247.0	293.5[c]	379.0	240.0	78.10	12.70	12.00	30.70	103.0	51.00[c]	52.3
Sulfate (mg/L)	44.50	68.50	50.40	36.65[c]	295.0	36.20	159.0	38.10	39.50	36.80	127.0	35.45[c]	80.59
TDS (mg/L)	991.0	542.0	933.0	1,045[c]	1,350	900.0	460.0	293.0	290.0	346.0	563.0	414.5[c]	677.3
Zn (mg/L)	0.059	0.052	0.067	0.061[c]	0.058	0.066	0.038	0.076	0.113	0.475	0.056	0.041[c]	0.097
TSS (mg/L)	5.00	4.00 U	4.00 U	5.50[c]	3.00	4.00	13.00	25.60	42.00 R	12.00	14.60	12.60[c]	9.03

a. ½ the detection limit was used in the yearly average calculations for those results reported as below the detection limit.

b. R flag indicates that the result was rejected during data validation. Therefore, the result is not included in the yearly average calculation.

c. The result shown is a monthly average of all the reported results for the month. For those parameters with all results for the month reported as below the detection limit, the result shown is the reported detection limit with a U flag.

d. Coliform samples were collected independent of the composite samples. Coliform samples were collected on the following dates: 11/30/1999, 12/14/1999, 1/12/2000, 2/14/2000, 3/29/2000, 4/19/2000, 5/16/2000, 6/7/2000, 7/31/2000, 8/15/2000, 9/20/2000, and 10/26/2000.

e. U flag indicates that the result was reported as below the detection limit.

with a permit year average of 9.03 mg/L. The March total nitrogen (TKN + NNN) concentration of 19.71 mg/L approached the permit limit of 20 mg/L. However, the permit limit for total nitrogen was not exceeded during the 2000 permit year.

Yearly average concentrations were higher than the yearly averages measured in past reporting periods for many of the parameters. Significant increasing trends were evident for NNN, TKN, TDS, and chloride when all permit data are considered. The elevated TDS average for permit year 2000 was caused by the historically high March result. Elevated sodium, chloride, and TDS concentrations are likely the result of effluents from demineralizer regeneration, boiler blowdown, and water softening. TDS concentrations appear to increase during the winter months, which could be attributed to reduced plant efficiency and possibly to boiler operations. A review of TAN utilities chemical use records identified an increase in salt use (for water softening) from approximately 9,050 lbs in 1997 to approximately 20,000 lbs in 1999 and 2000. The increase in salt usage can be attributed to the aging/inefficient water softener system and, possibly, an increased need for softened boiler make-up water resulting from reduced condensate returns (steam leaks). A reduction in salt usage is expected with the installation of a new water softener system. Sodium, chloride, and TDS effluent concentrations will continue to be monitored to determine the impact of the expected reduction in salt usage. Average fecal coliform concentration (over 10,000 col/100 mL) and total coliform concentration (almost 62,000 col/100 mL) both greatly exceeded past averages. An inspection of the integrity of the Imhoff tank is scheduled for the 2001 permit year to determine whether tank leakage is contributing to the increased coliform and nitrogen concentrations.

5.4.1 Flow Volumes

In addition to effluent concentration limits, the permit also specifies a limit for annual effluent flow volume to the pond. The flow meters for the TAN/TSF wastewater disposal facility are at the TAN-623 STP and the TAN-655 lift station. The flow meter at the STP measures just the sewage influent volume, while the flow meter at TAN-655 reads the combined STP and the process wastewater flows, which are joined at the TAN-655 sump before being pumped to the TAN/TSF Disposal Pond. Flow measurements recorded during the reporting period determined that the process wastewater constituted approximately 76% of the total effluent to the pond. Daily flow readings are recorded Monday through Thursday. Friday through Monday flow is a daily average of the four days. Table 5-2 summarizes monthly and total flow volumes, and Appendix D presents daily flow readings.

The permit flow limit is 34 MG per year discharged to the pond. Total effluent to the pond for the reporting period was 9.61 MG. Of that amount, 2.32 MG was comprised of sewage wastewater and the remainder of process wastewater.

5.5 Groundwater Monitoring Results

In order to measure potential Disposal Pond impacts to groundwater, the permit requires that groundwater samples be collected from four monitoring wells (see Figure 5-2):

- One background aquifer well (TANT-MON-A-001) upgradient of the Disposal Pond
- Three aquifer wells (TAN-10A, TAN-13A, and TANT-MON-A-002) downgradient of the Disposal Pond that serve as points of compliance.

Table 5-2. Test Area North/Technical Support Facility flow summaries.

Sample Month	Influent to STP[a]				Effluent to Pond			
	Average (gpd)	Minimum (gpd)	Maximum (gpd)	Total (MG)[b]	Average (gpd)	Minimum (gpd)	Maximum (gpd)	Total (MG)[b]
November 1999	4,698	2,260	23,910	0.14	20,680	16,000	42,000	0.62
December 1999	8,149	2,020	31,920	0.25	24,992	21,000	50,000	0.77
January 2000	6,209	770	11,880	0.19	22,258	19,000	34,000	0.69
February 2000	4,807	2,200	13,740	0.14	21,103	16,000	42,000	0.61
March 2000	4,836	2,750	8,970	0.15	21,013	15,000	34,000	0.65
April 2000	3,541	2,410	6,390	0.11	22,603	17,000	28,000	0.68
May 2000	4,334	2,240	11,220	0.13	26,372	16,000	34,250	0.82
June 2000	6,784	2,770	18,900	0.20	29,577	18,500	49,000	0.89
July 2000	7,317	2,750	17,610	0.23	34,145	18,500	54,000	1.06
August 2000	13,887	8,210	21,320	0.43	37,339	31,500	54,500	1.16
September 2000	6,422	3,310	14,490	0.19	27,517	22,000	36,000	0.83
October 2000	5,009	2,170	28,590	0.16	26,887	22,000	48,000	0.83
Overall	6,352	770	31,920	2.32	26,247	15,000	54,500	9.61

a. Influent flow measurements were not required by the permit, but are presented for comparison information.

b. Annual flow totals are shown in million gallons (MG).

Sampling must be conducted semiannually and must include several specified parameters for analysis. Contaminant concentrations in TAN-10A, TAN-13A, and TANT-MON-A-002 are now limited by primary constituent standards and secondary constituent standards specified in IDAPA 58.01.11, “Ground Water Quality Rule” (Idaho 1997). These standards replace the previous maximum allowable concentrations (MACs) and secondary maximum contaminant levels (SMCLs) specified in the groundwater quality standards (Idaho 1996b)

During the 2000 reporting period, groundwater sampling was conducted in April and October. Tables 5-3 and 5-4 show water levels (recorded prior to purging and sampling) and analytical results for all parameters specified by the permit. Iron concentrations exceeded permit standards in TANT-MON-A-001 (the background well) and TAN-13A in April and October, in TAN-MON-002 in April, and in TAN-10A in October. These observations are consistent with results of the past few years; elevated iron concentrations historically have been detected in the TAN WLAP monitoring wells. Due to increased iron concentrations in all four of the TAN WLAP wells in 1999, a corrosion evaluation (CORRPRO 2000) was performed at TAN wells that exhibited similar increases. This evaluation confirmed that the riser pipes at several TAN wells were significantly corroded and attributed the increased iron concentrations to the corrosion. Zinc concentrations in the TAN WLAP wells have sporadically increased over the past 5 years, with the first exceedance occurring in October 2000 in TAN-13A. The increased zinc concentrations are also believed to be the result of the riser pipe corrosion. Compliance sampling will continued to be reviewed to determine if there are any rising trends in zinc concentrations, particularly in TAN-13A. Riser pipe replacement is scheduled to begin in permit year 2001 for many of the TAN wells.

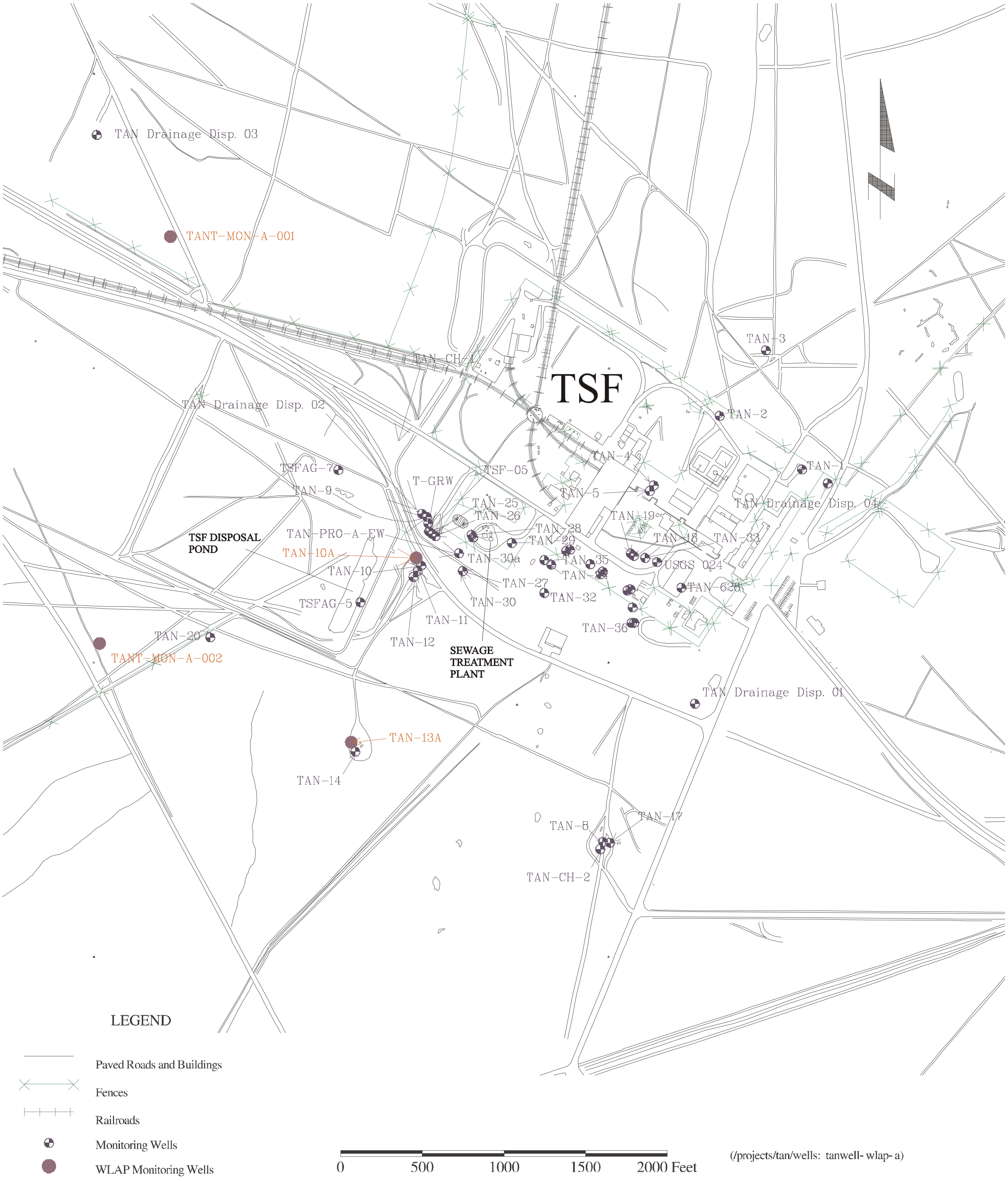


Figure 5-2. Locations of Test Area North/Technical Support Facility monitoring wells.

Table 5-3. Test Area North/Technical Support Facility Sewage Treatment Plant groundwater quality data for April 2000.

	TANT-MON-A-001	TANT-MON-A-002	TAN-10A	TAN-10A[a]	TAN-13A	PCS/SCS[b]
Depth to Water Table (ft)	202.48	207.23	202.79	202.79	205.83	
Sample Date	4/12/00 (mg/L)	4/12/00 (mg/L)	4/12/00 (mg/L)	4/12/00 (mg/L)	4/12/00 (mg/L)	(mg/L)
TKN	0.426	0.460	0.372	0.802	0.520	NA[d]
BOD	2.0 U[c]	2.0 U	2.0 U	2.0 U	2.0 U	NA
Chloride	11.0	3.50	89.5	89.5	4.00	250
TDS	205	184	423	422	179	500
Total P	0.0268	0.0328	0.0693	0.0715	0.0168	NA
Sodium	7.190	5.90	45.3	46.2	5.53	NA
NO_3N	0.86	0.5	2.4	2.3	0.37	10
NO_2N	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	1
$NO_2N + NO_3N$	0.876	0.487	2.37	2.41	0.354	10
NH_4N	0.01 U	0.0214	0.0442	0.0100	0.0126	NA
Arsenic	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.05
Barium	0.0734	0.0803	0.2110	0.2110	0.0731	2
Chromium	0.0044	0.0055	0.0025 U	0.0025 U	0.0040	0.01
Mercury	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.002
Selenium	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.05
Fluoride	0.331	0.248	0.2 U	0.2 U	0.251	4
Iron	1.610	1.080	0.0810	0.0866	1.720	0.3
Lead	0.0021	0.0029	0.0017	0.0015 U	0.0107	0.015
Manganese	0.0100	0.0256	0.0044	0.0045	0.0041	0.05
Sulfate	35.1	20.9	40.1	36.7	17.9	250
Zinc	0.621	0.940	0.625	0.623	1.690	5
Total Coliform	40 col/100 mL[e]	Absent	Absent	Absent	Absent	1 col/100 mL
Fecal Coliform	Absent	Absent	Absent	Absent	Absent	NA

a. Duplicate sample.

b. Primary constituent standards (PCSs) and secondary constituent standards (SCSs) in groundwater referenced in IDAPA 58.01.11.200.01.a and b. SCSs apply to chloride, TDS, iron, manganese, sulfate, and zinc.

c. U flag indicates that the result was reported as below the detection limit.

d. NA = not applicable.

e. Coliform bacteria was speciated as *citrobacter*.

Table 5-4. Test Area North/Technical Support Facility Sewage Treatment Plant groundwater quality data for October 2000.

	TANT-MON-A-001	TANT-MON-A-002	TAN-10A	TAN-10A[a]	TAN-13A	PCS/SCS[b]
Depth to Water Table (ft)	205.65	209.21	205.65	205.65	213.82	
Sample Date	10/4/00 (mg/L)	10/4/00 (mg/L)	10/11/00 (mg/L)	10/11/00 (mg/L)	10/11/00 (mg/L)	(mg/L)
TKN	0.117	0.203	0.1 U[c]	0.181	0.202	NA[d]
BOD	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA
Chloride	11.8	2.20	96.0	101	2.20	250
TDS	327	387	545	558	460	500
Total P	0.0437	0.0396	0.0702	0.0614	0.0453	NA
Sodium	7.03	6.89	48.4	48.5	5.56	NA
NO_3N	0.89	0.89	2.5	2.8	0.40	10
NO_2N	0.004 U	0.004 U	0.04 U	0.04 U	0.004 U	1
$NO_2N + NO_3N$	0.873	0.630	2.99	2.87	0.475	10
NH_4N	0.01 U	0.01 U	0.01 U	0.01 U	0.0138	NA
Arsenic	0.0044	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.05
Barium	0.0814	0.0833	0.222	0.223	0.0899	2
Chromium	0.0051	0.0035	0.0025 U	0.0025 U	0.0068	0.1
Mercury	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.002
Selenium	0.0025 U	0.0039	0.0025 U	0.0025 U	0.0025 U	0.05
Fluoride	0.221	0.301	0.2 U	0.202	0.248	4
Iron	2.83	0.0442	0.362	0.356	14.1	0.3
Iron (filtered)	NS[e]	NS	0.190	0.192	NS	0.3
Lead	0.0021	0.0015 U	0.0017	0.0015 U	0.0185	0.015
Manganese	0.0094	0.0025 U	0.0110	0.0107	0.0088	0.05
Sulfate	36.8	14.4	38.3	38.8	16.8	250
Zinc	1.03	0.0206	0.728	0.726	5.24	5
Total Coliform	Absent	Absent	Absent	Absent	Absent	1 col/100 mL
Fecal Coliform	Absent	Absent	Absent	Absent	Absent	NA

a. Duplicate sample.

b. Primary constituent standards (PCSs) and secondary constituent standards (SCSs) in groundwater referenced in IDAPA 58.01.11.200.01.a and b. SCSs apply to chloride, TDS, iron, manganese, sulfate, and zinc.

c. U flag indicates that the result was reported as below the detection limit.

d. NA = not applicable.

e. NS = Not sampled. These wells were not required to be sampled for filtered iron.

In October 2000, the lead concentration in TAN-13A (0.0185 mg/L) exceeded the permit limit of 0.015 mg/L. Yearly average lead concentrations in the effluent ranged from 0.004 mg/L in 1998 to 0.019 mg/L in 1997. No increasing trend is evident in effluent lead concentrations from 1996 to 2000. During that same period, lead concentrations in TAN-13A ranged from 0.001 in 1996 to 0.011 in 1998, until the October exceedance. Lead concentrations in all other downgradient wells have remained consistently low with no upward trend.

October 2000 TDS concentrations increased over 100 mg/L above the April 2000 concentrations in all four of the TAN WLAP wells. However, the only October exceedance reported was for TAN-10A, where the TDS concentration was 545 mg/L (558 mg/L in the duplicate sample). These increases would be consistent with the iron increases in the same wells and could be the effect of corrosion in the riser pipes. The increases in the effluent TDS levels over time are not believed to be the cause of the October 2000 groundwater exceedance. The average yearly TDS concentrations in the effluent for all years prior to 2000 have been below 500 mg/L, and based on estimated transport times, the increases in 2000 are not expected to have impacted the groundwater by the October sampling date. Additionally, the October 2000 TDS concentration in the upgradient well also increased.

Total coliform was absent in the 2000 sampling except for the presence of *citrobacter* reported in TANT-MON-A-001 for April 2000 (40 col/100mL). This coliform bacteria is a relatively free-living bacteria found in natural water bodies and soils. This, coupled with its detection in a well that is upgradient of the Disposal Pond, indicates that the Disposal Pond is unrelated to the detection of coliform in the groundwater.

Of the three compliance monitoring wells, TAN-10A exhibited the highest contaminant concentrations when compared to the background monitoring well located upgradient of the facility. It is difficult, however, to establish a strong relationship between the water quality in TAN-10A and the Disposal Pond due to two factors. First, contaminants resulting from the injectate from a former injection well (located close to TAN-10A and used for disposal of numerous waste streams, including those now discharged to the Disposal Pond) are still present in the groundwater and continue to have substantial impact on groundwater quality. Second, groundwater remediation studies now underway near the former injection well have a significant influence on local hydraulic gradients and contaminant concentrations near TAN-10A. Groundwater monitoring will continue in TAN-10A (as well as the other three wells) as a part of normal WLAP activities.

5.6 Summary of Environmental Impacts

The TAN/TSF effluent flow volumes and concentrations were within permit limits. Groundwater iron concentrations exceeded permit limits in April and October. Corrosion in the riser pipes in the wells is the probable cause of the elevated iron concentration. TDS, zinc, and lead groundwater concentrations in October exceeded permit limits in at least one compliance well. The corrosion in the riser pipes is also a possible cause of the elevated TDS and zinc concentrations. While lead concentrations in one compliance well exceeded the permit limit in October, no increasing trend is evident in the effluent lead concentrations, nor have levels in the other downgradient wells increased. Total coliform was absent in the 2000 sampling except in an upgradient well in a form that is found in natural water bodies and soils. Overall, environmental impacts are considered negligible.

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Appendix A

Central Facilities Area Sewage Treatment Plant Daily Influent and Effluent Flow Readings and STP Photographs

Appendix A

Central Facilities Area Sewage Treatment Plant Daily Influent and Effluent Flow Readings and STP Photographs

Table A-1. CFA STP daily influent and effluent flows.

Date	Influent to Lagoon (WW-014101) (gpd)	Effluent to Pivot (WW-104102) (gpd)	Date	Influent to Lagoon (WW-014101) (gpd)	Effluent to Pivot (WW-104102) (gpd)
12/1/2000	72,435	NF	12/27/2000	60,744	NF
12/2/2000	72,435	NF	12/28/2000	60,744	NF
12/3/2000	72,435	NF	12/29/2000	60,744	NF
12/4/2000	72,435	NF	12/30/2000	60,744	NF
12/5/2000	95,835	NF	12/31/2000	60,744	NF
12/6/2000	104,465	NF	1/1/2001	60,744	NF
12/7/2000	98,919	NF	1/2/2001	60,744	NF
12/8/2000	78,639	NF	1/3/2001	70,998	NF
12/9/2000	78,639	NF	1/4/2001	102,629	NF
12/10/2000	78,639	NF	1/5/2001	64,603	NF
12/11/2000	78,639	NF	1/6/2001	64,603	NF
12/12/2000	90,087	NF	1/7/2001	64,603	NF
12/13/2000	106,460	NF	1/8/2001	64,603	NF
12/14/2000	119,830	NF	1/9/2001	83,619	NF
12/15/2000	78,075	NF	1/10/2001	89,934	NF
12/16/2000	78,075	NF	1/11/2001	96,240	NF
12/17/2000	78,705	NF	1/12/2001	76,206	NF
12/18/2000	78,705	NF	1/13/2001	76,206	NF
12/19/2000	99,189	NF	1/14/2001	76,206	NF
12/20/2000	96,433	NF	1/15/2001	76,206	NF
12/21/2000	97,930	NF	1/16/2001	78,976	NF
12/22/2000	76,059	NF	1/17/2001	92,260	NF
12/23/2000	76,059	NF	1/18/2001	114,822	NF
12/24/2000	76,059	NF	1/19/2001	68,313	NF

Table A-1. (continued).

Date	Influent to Lagoon (WW-014101) (gpd)	Effluent to Pivot (WW-104102) (gpd)	Date	Influent to Lagoon (WW-014101) (gpd)	Effluent to Pivot (WW-104102) (gpd)
12/25/2000	76,059	NF	1/20/2001	68,313	NF
12/26/2000	76,059	NF	1/21/2001	68,313	NF
1/22/2001	68,313	NF	2/21/2001	102,499	NF
1/23/2001	89,014	NF	2/22/2001	92,416	NF
1/24/2001	110,497	NF	2/23/2001	66,813	NF
1/25/2001	89,580	NF	2/24/2001	66,813	NF
1/26/2001	67,219	NF	2/25/2001	66,813	NF
1/27/2001	67,219	NF	2/26/2001	66,813	NF
1/28/2001	67,219	NF	2/27/2001	89,057	NF
1/29/2001	67,219	NF	2/28/2001	89,185	NF
1/30/2001	81,506	NF	3/1/2001	97,507	NF
1/31/2001	84,477	NF	3/2/2001	99,340	NF
2/1/2001	89,934	NF	3/3/2001	99,340	NF
2/2/2001	69,606	NF	3/4/2001	99,340	NF
2/3/2001	69,606	NF	3/5/2001	99,340	NF
2/4/2001	69,606	NF	3/6/2001	99,340	NF
2/5/2001	69,606	NF	3/7/2001	117,899	NF
2/6/2001	95,348	NF	3/8/2001	115,411	NF
2/7/2001	93,426	NF	3/9/2001	75,655	NF
2/8/2001	102,538	NF	3/10/2001	75,655	NF
2/9/2001	66,226	NF	3/11/2001	75,655	NF
2/10/2001	66,226	NF	3/12/2001	75,655	NF
2/11/2001	66,226	NF	3/13/2001	108,494	NF
2/12/2001	66,226	NF	3/14/2001	100,742	NF
2/13/2001	88,671	NF	3/15/2001	101,172	NF
2/14/2001	88,912	NF	3/16/2001	73,084	NF
2/15/2001	109,257	NF	3/17/2001	73,084	NF
2/16/2001	64,665	NF	3/18/2001	73,084	NF
2/17/2001	64,665	NF	3/19/2001	73,084	NF
2/18/2001	64,665	NF	3/20/2001	106,194	NF
2/19/2001	64,665	NF	3/21/2001	136,622	NF

Table A-1. (continued).

Date	Influent to Lagoon (WW-014101) (gpd)	Effluent to Pivot (WW-104102) (gpd)	Date	Influent to Lagoon (WW-014101) (gpd)	Effluent to Pivot (WW-104102) (gpd)
2/20/2001	96,645	NF	3/22/2001	71,146	NF
3/23/2001	77,115	NF	4/22/2001	55,817	NF
3/24/2001	77,115	NF	4/23/2001	55,817	NF
3/25/2001	77,115	NF	4/24/2001	122,392	NF
3/26/2001	77,115	NF	4/25/2001	95,372	NF
3/27/2001	129,836	NF	4/26/2001	110,810	NF
3/28/2001	71,635	NF	4/27/2001	97,635	NF
3/29/2001	118,585	NF	4/28/2001	97,635	NF
3/30/2001	81,753	NF	4/29/2001	97,635	NF
3/31/2001	81,753	NF	4/30/2001	97,635	NF
4/1/2001	81,753	NF	5/1/2001	137,686	NF
4/2/2001	81,753	NF	5/2/2001	86,371	NF
4/3/2001	66,887	NF	5/3/2001	107,632	NF
4/4/2001	99,838	NF	5/4/2001	89,021	NF
4/5/2001	100,605	NF	5/5/2001	89,021	NF
4/6/2001	76,402	NF	5/6/2001	89,021	NF
4/7/2001	76,402	NF	5/7/2001	89,021	NF
4/8/2001	76,402	NF	5/8/2001	125,813	NF
4/9/2001	76,402	NF	5/9/2001	133,277	NF
4/10/2001	91,938	NF	5/10/2001	216,730	NF
4/11/2001	96,092	NF	5/11/2001	79,446	NF
4/12/2001	113,890	NF	5/12/2001	79,446	NF
4/13/2001	73,194	NF	5/13/2001	79,446	NF
4/14/2001	73,194	NF	5/14/2001	79,446	NF
4/15/2001	73,194	NF	5/15/2001	129,849	NF
4/16/2001	73,194	NF	5/16/2001	125,307	NF
4/17/2001	104,012	NF	5/17/2001	115,137	NF
4/18/2001	106,472	NF	5/18/2001	96,114	NF
4/19/2001	192,303	NF	5/19/2001	96,114	NF
4/20/2001	55,817	NF	5/20/2001	96,114	NF
4/21/2001	55,817	NF	5/21/2001	96,114	NF

Table A-1. (continued).

Date	Influent to Lagoon (WW-014101) (gpd)	Effluent to Pivot (WW-104102) (gpd)	Date	Influent to Lagoon (WW-014101) (gpd)	Effluent to Pivot (WW-104102) (gpd)
5/22/2001	128,357	NF	6/21/2001	195,605	156,900
5/23/2001	138,122	NF	6/22/2001	166,069	NF
5/24/2001	134,203	NF	6/23/2001	166,069	NF
5/25/2001	130,171	NF	6/24/2001	166,069	NF
5/26/2001	130,171	NF	6/25/2001	166,069	156,900
5/27/2001	130,171	NF	6/26/2001	207,879	156,950
5/28/2001	130,171	NF	6/27/2001	186,143	156,950
5/29/2001	130,171	NF	6/28/2001	168,070	157,000
5/30/2001	185,020	NF	6/29/2001	167,036	NF
5/31/2001	194,364	NF	6/30/2001	167,036	NF
6/1/2001	145,314	NF	7/1/2001	167,036	NF
6/2/2001	145,314	NF	7/2/2001	167,036	NF
6/3/2001	145,314	NF	7/3/2001	228,952	158,400
6/4/2001	145,314	NF	7/4/2001	164,411	NF
6/5/2001	154,004	NF	7/5/2001	164,411	NF
6/6/2001	173,188	NF	7/6/2001	199,978	156,600
6/7/2001	177,719	NF	7/7/2001	199,978	156,600
6/8/2001	164,955	NF	7/8/2001	199,978	156,600
6/9/2001	164,955	NF	7/9/2001	199,978	156,600
6/10/2001	164,955	NF	7/10/2001	259,720	157,000
6/11/2001	164,955	NF	7/11/2001	207,806	156,300
6/12/2001	181,051	173,100	7/12/2001	200,415	NF
6/13/2001	152,103	NF	7/13/2001	201,961	NF
6/14/2001	163,397	157,400	7/14/2001	201,961	NF
6/15/2001	151,379	NF	7/15/2001	201,961	NF
6/16/2001	151,379	NF	7/16/2001	201,961	195,000
6/17/2001	151,379	NF	7/17/2001	199,361	193,900
6/18/2001	151,379	157,400	7/18/2001	212,544	194,300
6/19/2001	182,929	157,100	7/19/2001	223,895	194,400
6/20/2001	198,417	157,300	7/20/2001	216,263	194,400

Table A-1. (continued).

Date	Influent to Lagoon (WW-014101) (gpd)	Effluent to Pivot (WW-104102) (gpd)	Date	Influent to Lagoon (WW-014101) (gpd)	Effluent to Pivot (WW-104102) (gpd)
7/21/2001	216,263	194,400	8/20/2001	188,433	193,800
7/22/2001	216,263	194,400	8/21/2001	207,218	193,600
7/23/2001	216,263	194,500	8/22/2001	213,250	195,000
7/24/2001	228,504	194,300	8/23/2001	212,451	157,300
7/25/2001	193,586	194,300	8/24/2001	178,835	157,300
7/26/2001	236,970	194,450	8/25/2001	201,727	157,300
7/27/2001	202,836	194,450	8/26/2001	147,114	157,300
7/28/2001	202,836	194,450	8/27/2001	195,095	157,500
7/29/2001	202,836	194,450	8/28/2001	206,756	157,300
7/30/2001	202,836	194,600	8/29/2001	216,611	157,200
7/31/2001	212,496	198,300	8/30/2001	199,824	157,560
8/1/2001	220,613	196,000	8/31/2001	212,087	157,560
8/2/2001	234,477	194,250	9/1/2001	176,656	157,560
8/3/2001	236,923	194,250	9/2/2001	165,986	157,560
8/4/2001	135,410	194,250	9/3/2001	178,973	157,560
8/5/2001	175,525	194,250	9/4/2001	178,793	155,700
8/6/2001	193,186	195,500	9/5/2001	241,995	155,700
8/7/2001	219,315	195,800	9/6/2001	159,127	157,900
8/8/2001	215,526	193,600	9/7/2001	170,918	NF
8/9/2001	237,057	157,200	9/8/2001	144,788	NF
8/10/2001	202,124	157,200	9/9/2001	151,569	NF
8/11/2001	175,207	157,200	9/10/2001	170,918	157,700
8/12/2001	162,781	157,200	9/11/2001	196,111	157,400
8/13/2001	233,753	156,500	9/12/2001	198,986	157,600
8/14/2001	177,403	193,800	9/13/2001	213,289	157,250
8/15/2001	207,223	194,600	9/14/2001	134,688	157,250
8/16/2001	223,908	180,100	9/15/2001	139,481	157,250
8/17/2001	187,879	180,100	9/16/2001	137,422	157,250
8/18/2001	178,125	NF	9/17/2001	155,127	157,400
8/19/2001	167,078	NF	9/18/2001	168,514	157,300
9/19/2001	186,825	157,300	10/19/200	138,820	NF

Table A-1. (continued).

Date	Influent to Lagoon (WW-014101) (gpd)	Effluent to Pivot (WW-104102) (gpd)	Date	Influent to Lagoon (WW-014101) (gpd)	Effluent to Pivot (WW-104102) (gpd)
			1		
9/20/2001	169,756	156,475	10/20/2001	119,074	NF
9/21/2001	149,790	156,475	10/21/2001	115,129	NF
9/22/2001	136,673	156,475	10/22/2001	122,248	NF
9/23/2001	127,123	156,475	10/23/2001	132,273	NF
9/24/2001	155,891	157,500	10/24/2001	127,744	NF
9/25/2001	183,666	157,200	10/25/2001	136,239	NF
9/26/2001	177,108	157,300	10/26/2001	117,462	NF
9/27/2001	192,444	157,400	10/27/2001	111,777	NF
9/28/2001	178,364	NF	10/28/2001	122,658	NF
9/29/2001	164,696	NF	10/29/2001	103,178	NF
9/30/2001	148,779	NF	10/30/2001	142,707	NF
10/1/2001	157,406	NF	10/31/2001	146,670	NF
10/2/2001	190,376	NF	11/1/2001	150,593	NF
10/3/2001	186,383	NF	11/2/2001	128,288	NF
10/4/2001	179,774	NF	11/3/2001	112,964	NF
10/5/2001	200,793	NF	11/4/2001	96,528	NF
10/6/2001	81,018	NF	11/5/2001	125,752	NF
10/7/2001	142,890	NF	11/6/2001	147,681	NF
10/8/2001	146,097	NF	11/7/2001	132,419	NF
10/9/2001	167,417	NF	11/8/2001	135,909	NF
10/10/2001	156,213	NF	11/9/2001	116,230	NF
10/11/2001	167,835	NF	11/10/2001	104,151	NF

Table A-1. (continued).

Date	Influent to Lagoon (WW-014101) (gpd)	Effluent to Pivot (WW-104102) (gpd)	Date	Influent to Lagoon (WW-014101) (gpd)	Effluent to Pivot (WW-104102) (gpd)
10/12/2001	154,687	NF	11/11/2001	92,544	NF
10/13/2001	142,400	NF	11/12/2001	113,066	NF
10/14/2001	136,813	NF	11/13/2001	115,582	NF
10/15/2001	134,681	NF	11/14/2001	114,776	NF
10/16/2001	171,928	NF	11/15/2001	115,817	NF
10/17/2001	171,786	NF	11/16/2001	132,733	NF
10/18/2001	134,380	NF	11/17/2001	53,222	NF
11/18/2001	85,333	NF	11/25/2001	49,861	NF
11/19/2001	77,284	NF	11/26/2001	56,041	NF
11/20/2001	74,902	NF	11/27/2001	71,259	NF
11/21/2001	80,968	NF	11/28/2001	95,582	NF
11/22/2001	73,756	NF	11/29/2001	107,113	NF
11/23/2001	53,601	NF	11/30/2001	91,677	NF
11/24/2001	51,549	NF			

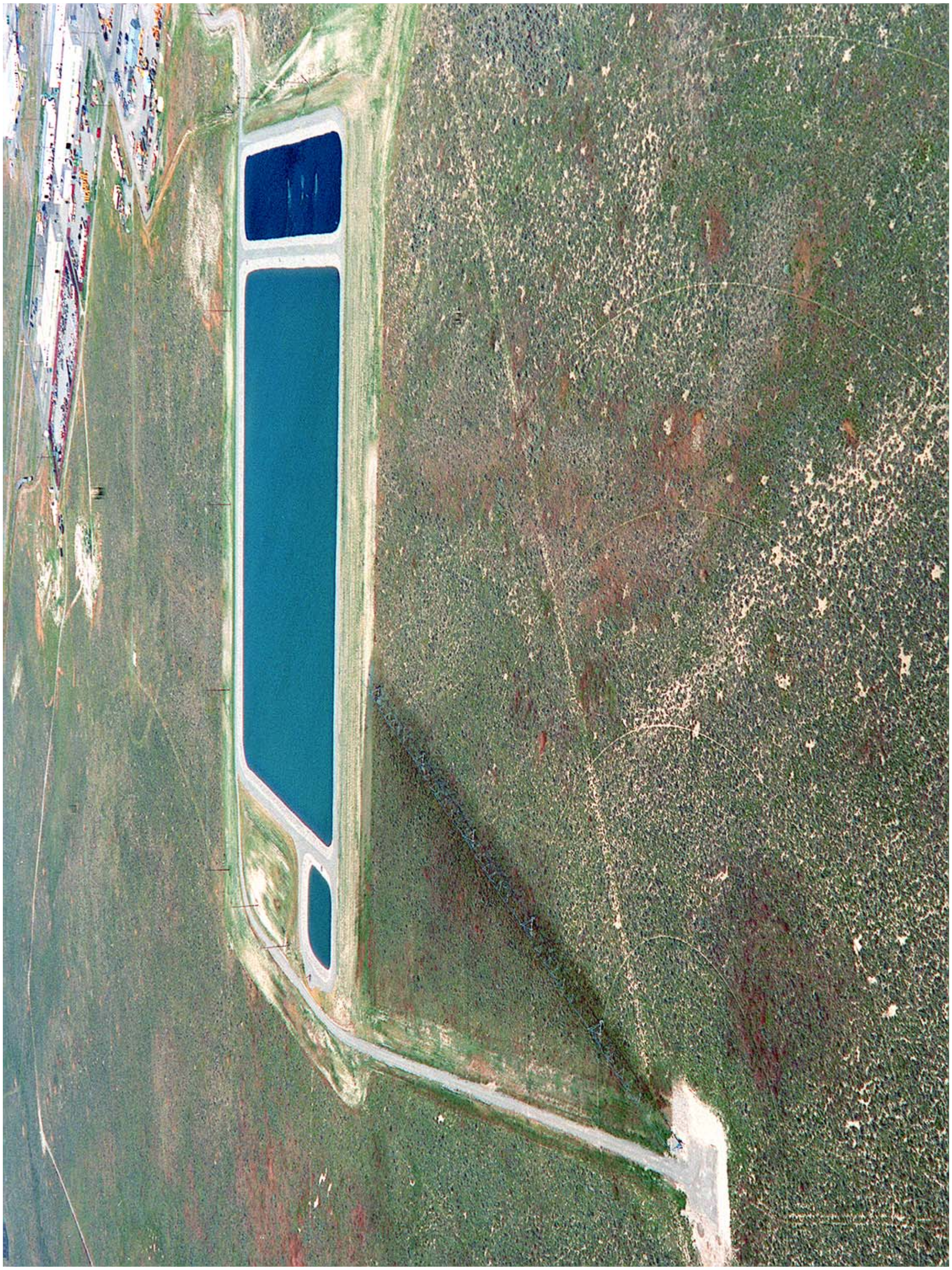

Figure A-1. Central Facilities Area Sewage Treatment Plant, 1995 (95-627-7-4).

Figure A-2. Central Facilities Area Sewage Treatment Plant, 1996 (96-174-9-8).

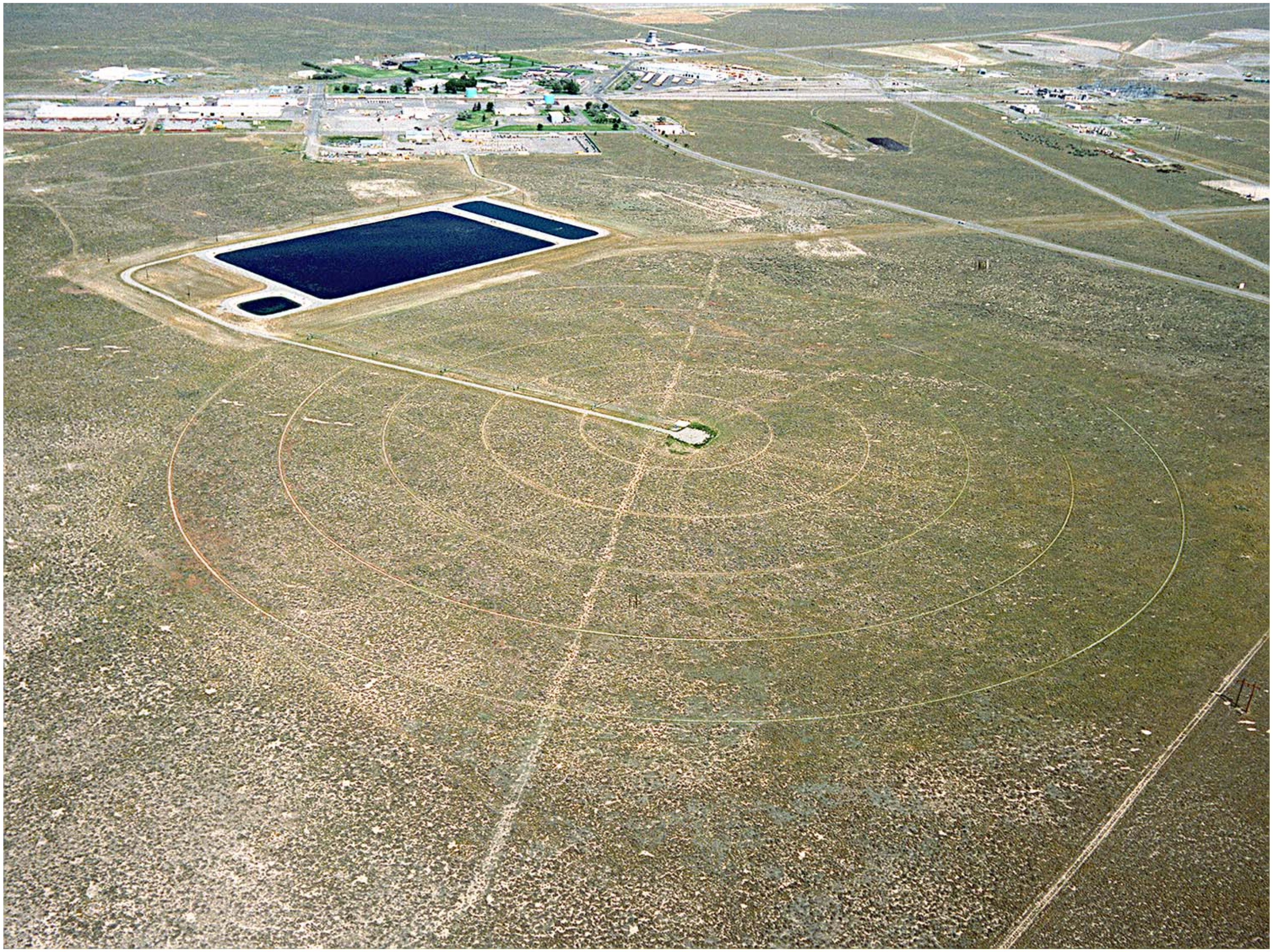

Figure A-3. Central Facilities Area Sewage Treatment Plant, 1997 (97-620-5-14).

Figure A-4. Central Facilities Area Sewage Treatment Plant, 1998 (98-454-11-6).

Figure A-5. Central Facilities Area Sewage Treatment Plant, 1999 (99-344-10-9).

Figure A-6. Central Facilities Area Sewage Treatment Plant, 2000 (00-296-2-2).

Appendix B

Idaho Nuclear Technology and Engineering Center Percolation Pond Daily Effluent Flow Readings

Appendix B

Idaho Nuclear Technology and Engineering Center Percolation Pond Daily Effluent Flow Readings

Table B-1. INTEC percolation pond daily effluent flows.

Date	Effluent (WW-013001) CPP-797 (gpd)	Date	Effluent (WW-013001) CPP-797 (gpd)
11/1/1999	939,300	12/2/1999	904,900
11/2/1999	786,700	12/3/1999	695,300
11/3/1999	781,900	12/4/1999	912,200
11/4/1999	787,500	12/5/1999	791,300
11/5/1999	765,200	12/6/1999	928,200
11/6/1999	737,300	12/7/1999	981,900
11/7/1999	763,000	12/8/1999	970,100
11/8/1999	719,000	12/9/1999	979,100
11/9/1999	744,400	12/10/1999	981,300
11/10/1999	720,300	12/11/1999	965,600
11/11/1999	714,200	12/12/1999	993,100
11/12/1999	674,000	12/13/1999	953,300
11/13/1999	656,400	12/14/1999	942,200
11/14/1999	499,800	12/15/1999	939,900
11/15/1999	631,900	12/16/1999	939,400
11/16/1999	1,138,700	12/17/1999	1,074,100
11/17/1999	784,000	12/18/1999	926,100
11/18/1999	751,100	12/19/1999	940,500
11/19/1999	755,200	12/20/1999	939,700
11/20/1999	891,700	12/21/1999	930,600
11/21/1999	815,900	12/22/1999	946,500
11/22/1999	714,100	12/23/1999	915,800
11/23/1999	743,400	12/24/1999	920,300
11/24/1999	802,000	12/25/1999	892,900
11/25/1999	842,500	12/26/1999	933,100
11/26/1999	838,000	12/27/1999	900,300
11/27/1999	838,300	12/28/1999	922,800
11/28/1999	867,900	12/29/1999	920,000
11/29/1999	855,500	12/30/1999	937,900
11/30/1999	832,200	12/31/1999	924,900
12/1/1999	897,900	1/1/2000	1,363,800

Table B-1. (continued).

Date	Effluent (WW-013001) CPP-797 (gpd)	Date	Effluent (WW-013001) CPP-797 (gpd)
1/2/2000	1,363,700	2/7/2000	1,040,900
1/3/2000	1,364,400	2/8/2000	1,054,800
1/4/2000	1,440,900	2/9/2000	1,059,200
1/5/2000	927,200	2/10/2000	1,082,800
1/6/2000	959,000	2/11/2000	1,132,600
1/7/2000	972,800	2/12/2000	1,271,000
1/8/2000	950,300	2/13/2000	1,246,700
1/9/2000	928,100	2/14/2000	1,028,800
1/10/2000	957,100	2/15/2000	1,097,400
1/11/2000	959,400	2/16/2000	1,000,300
1/12/2000	968,000	2/17/2000	962,500
1/13/2000	945,600	2/18/2000	1,031,700
1/14/2000	933,400	2/19/2000	979,200
1/15/2000	885,000	2/20/2000	1,012,100
1/16/2000	876,400	2/21/2000	1,041,600
1/17/2000	896,300	2/22/2000	1,020,800
1/18/2000	872,100	2/23/2000	1,075,200
1/19/2000	899,000	2/24/2000	1,024,000
1/20/2000	888,200	2/25/2000	1,027,400
1/21/2000	894,500	2/26/2000	996,100
1/22/2000	907,600	2/27/2000	1,023,400
1/23/2000	944,800	2/28/2000	1,020,300
1/24/2000	910,900	2/29/2000	1,026,600
1/25/2000	864,100	3/1/2000	1,055,500
1/26/2000	947,600	3/2/2000	1,071,000
1/27/2000	1,089,000	3/3/2000	1,126,000
1/28/2000	1,089,300	3/4/2000	1,259,700
1/29/2000	990,500	3/5/2000	1,245,700
1/30/2000	954,500	3/6/2000	1,261,800
1/31/2000	932,100	3/7/2000	1,351,300
2/1/2000	977,900	3/8/2000	1,275,400
2/2/2000	1,053,900	3/9/2000	1,275,300
2/3/2000	1,075,100	3/10/2000	1,175,700
2/4/2000	1,057,800	3/11/2000	948,900
2/5/2000	1,054,300	3/12/2000	968,600
2/6/2000	1,052,100	3/13/2000	971,600

Table B-1. (continued).

Date	Effluent (WW-013001) CPP-797 (gpd)	Date	Effluent (WW-013001) CPP-797 (gpd)
3/14/2000	1,019,700	4/19/2000	1,190,000
3/15/2000	1,017,200	4/20/2000	1,190,800
3/16/2000	1,042,600	4/21/2000	1,077,300
3/17/2000	1,036,600	4/22/2000	1,093,600
3/18/2000	1,006,900	4/23/2000	1,078,100
3/19/2000	952,000	4/24/2000	1,016,600
3/20/2000	921,900	4/25/2000	1,053,800
3/21/2000	940,100	4/26/2000	1,044,200
3/22/2000	978,000	4/27/2000	1,081,400
3/23/2000	994,100	4/28/2000	1,107,700
3/24/2000	953,800	4/29/2000	1,090,300
3/25/2000	1,022,500	4/30/2000	1,087,100
3/26/2000	1,058,200	5/1/2000	1,041,700
3/27/2000	1,161,900	5/2/2000	1,001,900
3/28/2000	1,189,900	5/3/2000	1,023,600
3/29/2000	1,169,600	5/4/2000	1,020,000
3/30/2000	1,184,700	5/5/2000	1,035,000
3/31/2000	1,241,300	5/6/2000	991,900
4/1/2000	1,184,600	5/7/2000	1,017,100
4/2/2000	1,201,400	5/8/2000	1,038,600
4/3/2000	1,195,200	5/9/2000	1,058,400
4/4/2000	1,204,300	5/10/2000	1,023,200
4/5/2000	1,135,300	5/11/2000	1,031,300
4/6/2000	1,096,200	5/12/2000	1,030,000
4/7/2000	1,047,600	5/13/2000	936,500
4/8/2000	1,062,100	5/14/2000	915,000
4/9/2000	879,600	5/15/2000	880,300
4/10/2000	848,800	5/16/2000	891,500
4/11/2000	898,200	5/17/2000	888,400
4/12/2000	963,000	5/18/2000	1,025,300
4/13/2000	873,000	5/19/2000	1,113,200
4/14/2000	870,000	5/20/2000	1,090,900
4/15/2000	926,500	5/21/2000	1,088,300
4/16/2000	1,084,100	5/22/2000	996,300
4/17/2000	1,131,200	5/23/2000	1,019,400
4/18/2000	1,134,800	5/24/2000	1,033,400

Table B-1. (continued).

Date	Effluent (WW-013001) CPP-797 (gpd)	Date	Effluent (WW-013001) CPP-797 (gpd)
5/25/2000	994,000	6/30/2000	1,067,800
5/26/2000	1,032,900	7/1/2000	1,142,000
5/27/2000	1,011,500	7/2/2000	1,053,500
5/28/2000	1,015,900	7/3/2000	1,034,800
5/29/2000	962,100	7/4/2000	1,069,900
5/30/2000	1,027,300	7/5/2000	1,066,400
5/31/2000	967,100	7/6/2000	1,061,200
6/1/2000	961,300	7/7/2000	1,041,400
6/2/2000	911,000	7/8/2000	1,045,600
6/3/2000	876,300	7/9/2000	1,042,000
6/4/2000	910,300	7/10/2000	1,052,800
6/5/2000	905,900	7/11/2000	1,019,000
6/6/2000	922,200	7/12/2000	1,072,300
6/7/2000	896,200	7/13/2000	1,022,100
6/8/2000	870,900	7/14/2000	1,041,400
6/9/2000	919,000	7/15/2000	1,042,100
6/10/2000	890,000	7/16/2000	1,046,300
6/11/2000	895,000	7/17/2000	1,051,600
6/12/2000	897,400	7/18/2000	1,072,900
6/13/2000	924,900	7/19/2000	1,072,900
6/14/2000	1,010,200	7/20/2000	1,063,300
6/15/2000	1,029,400	7/21/2000	1,123,700
6/16/2000	1,065,500	7/22/2000	1,291,700
6/17/2000	1,041,800	7/23/2000	1,356,600
6/18/2000	1,053,200	7/24/2000	1,385,000
6/19/2000	1,021,300	7/25/2000	1,369,600
6/20/2000	1,050,900	7/26/2000	1,336,800
6/21/2000	1,073,300	7/27/2000	1,229,300
6/22/2000	1,117,400	7/28/2000	1,245,000
6/23/2000	1,100,000	7/29/2000	1,263,200
6/24/2000	1,082,700	7/30/2000	1,249,800
6/25/2000	1,073,800	7/31/2000	1,248,000
6/26/2000	1,076,800	8/1/2000	1,260,000
6/27/2000	1,085,700	8/2/2000	1,413,500
6/28/2000	1,059,600	8/3/2000	1,396,100
6/29/2000	1,030,400	8/4/2000	1,401,700

Table B-1. (continued).

Date	Effluent (WW-013001) CPP-797 (gpd)	Date	Effluent (WW-013001) CPP-797 (gpd)
8/5/2000	1,378,600	9/10/2000	1,169,600
8/6/2000	1,368,000	9/11/2000	1,128,100
8/7/2000	1,357,900	9/12/2000	1,209,100
8/8/2000	1,395,600	9/13/2000	1,144,700
8/9/2000	1,358,900	9/14/2000	1,239,300
8/10/2000	1,415,200	9/15/2000	1,390,100
8/11/2000	1,449,500	9/16/2000	1,447,300
8/12/2000	1,555,200	9/17/2000	1,236,200
8/13/2000	1,533,200	9/18/2000	1,203,700
8/14/2000	1,541,800	9/19/2000	1,422,300
8/15/2000	1,481,600	9/20/2000	1,429,400
8/16/2000	1,537,200	9/21/2000	1,375,000
8/17/2000	1,424,500	9/22/2000	1,364,700
8/18/2000	1,410,400	9/23/2000	1,298,600
8/19/2000	1,395,900	9/24/2000	1,286,400
8/20/2000	1,360,700	9/25/2000	1,170,100
8/21/2000	1,381,400	9/26/2000	1,241,800
8/22/2000	1,436,100	9/27/2000	1,103,300
8/23/2000	1,433,700	9/28/2000	1,134,000
8/24/2000	1,351,000	9/29/2000	1,137,000
8/25/2000	1,274,600	9/30/2000	1,215,500
8/26/2000	1,191,900	10/1/2000	1,035,200
8/27/2000	1,185,000	10/2/2000	998,600
8/28/2000	1,177,300	10/3/2000	985,100
8/29/2000	1,187,300	10/4/2000	1,077,800
8/30/2000	1,183,700	10/5/2000	1,061,600
8/31/2000	1,175,900	10/6/2000	1,072,400
9/1/2000	1,332,900	10/7/2000	1,135,500
9/2/2000	1,350,600	10/8/2000	1,107,400
9/3/2000	1,367,900	10/9/2000	1,136,300
9/4/2000	1,377,300	10/10/2000	1,171,700
9/5/2000	1,355,700	10/11/2000	1,168,200
9/6/2000	1,304,200	10/12/2000	1,225,300
9/7/2000	1,317,200	10/13/2000	1,225,300
9/8/2000	1,233,200	10/14/2000	957,400
9/9/2000	1,161,200	10/15/2000	1,023,400

Table B-1. (continued).

Date	Effluent (WW-013001) CPP-797 (gpd)	Date	Effluent (WW-013001) CPP-797 (gpd)
10/16/2000	1,041,400	10/24/2000	802,000
10/17/2000	1,014,500	10/25/2000	842,500
10/18/2000	992,000	10/26/2000	838,000
10/19/2000	1,090,300	10/27/2000	838,300
10/20/2000	957,400	10/28/2000	867,900
10/21/2000	942,200	10/29/2000	855,500
10/22/2000	929,400	10/30/2000	832,200
10/23/2000	743,400	10/31/2000	643,800

Appendix C

Idaho Nuclear Technology and Engineering Center Sewage Treatment Plant Daily Influent and Effluent Flow Readings

Appendix C

Idaho Nuclear Technology and Engineering Center Sewage Treatment Plant Daily Influent and Effluent Flow Readings

Table C-1. INTEC STP influent and effluent to infiltration trenches

Date	Influent (gpd)	Effluent to Trenches (gpd)	Date	Influent (gpd)	Effluent to Trenches (gpd)
11/1/1999	33,207	16,130	12/3/1999	63,305	31,400
11/2/1999	61,441	33,550	12/4/1999	51,338	22,323
11/3/1999	56,275	46,907	12/5/1999	44,003	13,560
11/4/1999	53,185	40,885	12/6/1999	47,693	14,577
11/5/1999	44,143	34,245	12/7/1999	53,072	25,396
11/6/1999	36,102	21,528	12/8/1999	48,317	29,093
11/7/1999	35,064	20,805	12/9/1999	46,832	11,431
11/8/1999	40,061	20,198	12/10/1999	41,783	25,114
11/9/1999	57,378	39,857	12/11/1999	34,870	9,652
11/10/1999	46,278	35,607	12/12/1999	41,422	9,767
11/11/1999	71,111	49,293	12/13/1999	44,051	12,602
11/12/1999	78,719	43,945	12/14/1999	38,753	21,486
11/13/1999	48,238	20,047	12/15/1999	44,969	18,726
11/14/1999	43,821	19,413	12/16/1999	64,145	25,338
11/15/1999	34,233	8,433	12/17/1999	31,388	15,086
11/16/1999	44,934	21,571	12/18/1999	36,466	11,408
11/17/1999	44,835	22,365	12/19/1999	36,203	11,045
11/18/1999	55,534	30,352	12/20/1999	35,836	8,178
11/19/1999	46,190	24,052	12/21/1999	44,593	17,967
11/20/1999	36,908	11,892	12/22/1999	48,618	20,735
11/21/1999	38,228	12,004	12/23/1999	48,736	20,885
11/22/1999	37,462	9,564	12/24/1999	40,239	17,942
11/23/1999	49,125	24,931	12/25/1999	32,032	8,871
11/24/1999	49,490	26,002	12/26/1999	33,083	16,285
11/25/1999	44,551	23,231	12/27/1999	34,469	20,647
11/26/1999	35,566	14,071	12/28/1999	34,934	19,205
11/27/1999	35,160	11,905	12/29/1999	46,004	16,521
11/28/1999	35,868	13,117	12/30/1999	48,965	22,299
11/29/1999	36,285	11,138	12/31/1999	42,106	16,696
11/30/1999	43,882	24,608	1/1/2000	47,676	18,217
12/1/1999	47,756	23,138	1/2/2000	48,892	19,645
12/2/1999	63,304	31,400	1/3/2000	40,261	19,022

Table C-1. (continued).

Date	Influent (gpd)	Effluent to Trenches (gpd)	Date	Influent (gpd)	Effluent to Trenches (gpd)
1/4/2000	64,170	32,670	2/10/2000	52,500	40,218
1/5/2000	40,144	26,407	2/11/2000	52,814	37,373
1/6/2000	58,009	34,027	2/12/2000	49,302	28,526
1/7/2000	63,153	35,166	2/13/2000	45,799	27,896
1/8/2000	39,918	17,527	2/14/2000	51,867	27,234
1/9/2000	78,311	18,733	2/15/2000	94,767	80,559
1/10/2000	40,973	15,784	2/16/2000	57,216	48,727
1/11/2000	61,210	36,871	2/17/2000	68,192	38,522
1/12/2000	50,631	33,397	2/18/2000	47,822	38,266
1/13/2000	54,525	31,450	2/19/2000	41,959	22,857
1/14/2000	49,969	32,050	2/20/2000	40,157	20,828
1/15/2000	42,298	18,622	2/21/2000	49,113	22,599
1/16/2000	46,170	24,055	2/22/2000	55,570	52,559
1/17/2000	45,216	25,881	2/23/2000	50,075	37,772
1/18/2000	68,681	49,980	2/24/2000	56,962	40,899
1/19/2000	56,196	35,458	2/25/2000	43,710	37,908
1/20/2000	58,161	36,139	2/26/2000	38,080	18,198
1/21/2000	56,231	36,770	2/27/2000	34,655	16,702
1/22/2000	39,204	21,050	2/28/2000	48,939	26,036
1/23/2000	38,196	17,533	2/29/2000	53,116	30,772
1/24/2000	45,114	18,839	3/1/2000	46,295	40,690
1/25/2000	78,475	50,948	3/2/2000	53,874	35,986
1/26/2000	60,086	40,785	3/3/2000	48,877	31,051
1/27/2000	76,155	49,718	3/4/2000	43,114	19,791
1/28/2000	48,381	34,170	3/5/2000	47,608	18,842
1/29/2000	54,303	28,943	3/6/2000	48,180	26,494
1/30/2000	50,209	28,890	3/7/2000	45,563	32,875
1/31/2000	51,668	25,397	3/8/2000	52,656	30,306
2/1/2000	62,872	39,615	3/9/2000	45,199	38,001
2/2/2000	51,190	32,861	3/10/2000	45,199	38,001
2/3/2000	62,003	44,230	3/11/2000	46,641	17,886
2/4/2000	57,203	37,766	3/12/2000	49,219	19,116
2/5/2000	49,992	24,421	3/13/2000	41,505	14,528
2/6/2000	43,450	25,792	3/14/2000	56,161	28,762
2/7/2000	49,380	25,575	3/15/2000	50,865	27,043
2/8/2000	54,244	38,817	3/16/2000	50,865	27,043
2/9/2000	60,989	40,283	3/17/2000	42,285	25,955

Table C-1. (continued).

Date	Influent (gpd)	Effluent to Trenches (gpd)	Date	Influent (gpd)	Effluent to Trenches (gpd)
3/18/2000	34,306	11,512	4/24/2000	35,056	275
3/19/2000	33,611	13,544	4/25/2000	51,408	181
3/20/2000	33,311	15,853	4/26/2000	47,283	205
3/21/2000	47,079	21,412	4/27/2000	48,180	96
3/22/2000	48,119	26,230	4/28/2000	40,965	65
3/23/2000	49,537	27,137	4/29/2000	39,839	40
3/24/2000	43,955	22,647	4/30/2000	31,904	128
3/25/2000	42,809	13,851	5/1/2000	32,076	131
3/26/2000	61,520	11,520	5/2/2000	55,657	230
3/27/2000	45,445	14,467	5/3/2000	40,178	159
3/28/2000	61,876	30,230	5/4/2000	44,498	185
3/29/2000	46,564	28,014	5/5/2000	16,603	284
3/30/2000	42,943	24,905	5/6/2000	16,603	284
3/31/2000	43,501	24,148	5/7/2000	14,338	292
4/1/2000	33,790	12,672	5/8/2000	58,176	382
4/2/2000	27,577	9,107	5/9/2000	71,689	17,443
4/3/2000	46,931	17,132	5/10/2000	29,485	17,830
4/4/2000	46,931	17,132	5/11/2000	68,905	25,186
4/5/2000	46,804	23,461	5/12/2000	34,638	18,223
4/6/2000	46,779	23,389	5/13/2000	17,857	6,325
4/7/2000	36,074	15,390	5/14/2000	25,703	3,552
4/8/2000	32,288	6,208	5/15/2000	30,994	2,447
4/9/2000	26,583	16	5/16/2000	59,018	30,249
4/10/2000	31,270	246	5/17/2000	50,146	34,070
4/11/2000	49,598	141	5/18/2000	44,510	23,772
4/12/2000	50,472	148	5/19/2000	55,770	27,494
4/13/2000	49,085	130	5/20/2000	29,059	5,053
4/14/2000	52,006	181	5/21/2000	35,203	1,561
4/15/2000	34,049	283	5/22/2000	34,104	593
4/16/2000	31,382	334	5/23/2000	75,189	17,834
4/17/2000	40,593	398	5/24/2000	41,751	16,324
4/18/2000	62,517	397	5/25/2000	65,374	24,233
4/19/2000	44,869	249	5/26/2000	29,777	15,760
4/20/2000	50,530	287	5/27/2000	33,133	8,008
4/21/2000	43,465	220	5/28/2000	29,516	3,490
4/22/2000	35,264	279	5/29/2000	31,257	1,329
4/23/2000	43,041	303	5/30/2000	51,048	790

Table C-1. (continued).

Date	Influent (gpd)	Effluent to Trenches (gpd)	Date	Influent (gpd)	Effluent to Trenches (gpd)
5/31/2000	25,833	9,143	7/7/2000	30,749	18,727
6/1/2000	50,982	12,100	7/8/2000	26,391	9,583
6/2/2000	34,539	16,156	7/9/2000	22,999	4,058
6/3/2000	24,688	4,317	7/10/2000	23,447	765
6/4/2000	30,501	4,255	7/11/2000	48,470	22,635
6/5/2000	23,300	4,181	7/12/2000	19,085	13,602
6/6/2000	38,921	14,069	7/13/2000	41,307	17,983
6/7/2000	33,592	12,948	7/14/2000	36,900	17,943
6/8/2000	42,703	16,413	7/15/2000	36,060	9,787
6/9/2000	61,731	16,708	7/16/2000	28,277	9,127
6/10/2000	33,755	7,490	7/17/2000	31,284	11,158
6/11/2000	27,060	3,858	7/18/2000	82,859	58,632
6/12/2000	43,249	5,646	7/19/2000	54,446	43,888
6/13/2000	41,748	19,772	7/20/2000	47,062	22,701
6/14/2000	20,747	11,359	7/21/2000	17,840	15,270
6/15/2000	37,744	18,377	7/22/2000	19,053	6,356
6/16/2000	29,586	11,317	7/23/2000	20,774	1,336
6/17/2000	17,610	180	7/24/2000	29,730	402
6/18/2000	17,547	2,743	7/25/2000	21,873	10,459
6/19/2000	28,928	2,148	7/26/2000	34,744	11,866
6/20/2000	29,014	20,203	7/27/2000	41,691	28,514
6/21/2000	33,195	16,560	7/28/2000	36,119	18,835
6/22/2000	36,727	16,725	7/29/2000	14,839	7,171
6/23/2000	38,734	17,560	7/30/2000	13,904	399
6/24/2000	22,949	6,605	7/31/2000	16,420	417
6/25/2000	21,256	2,606	8/1/2000	44,517	17,864
6/26/2000	23,698	1,723	8/2/2000	49,547	19,734
6/27/2000	37,271	20,337	8/3/2000	18,764	6,059
6/28/2000	37,948	16,862	8/4/2000	20,421	13,959
6/29/2000	40,040	15,781	8/5/2000	23,736	9,963
6/30/2000	21,699	10,347	8/6/2000	15,366	1,735
7/1/2000	12,579	1,177	8/7/2000	22,849	707
7/2/2000	19,341	445	8/8/2000	49,041	10,743
7/3/2000	15,723	36	8/9/2000	34,358	16,085
7/4/2000	26,114	965	8/10/2000	23,867	14,411
7/5/2000	29,297	2,754	8/11/2000	26,049	17,232
7/6/2000	32,862	13,389	8/12/2000	27,512	2,064

Table C-1. (continued).

Date	Influent (gpd)	Effluent to Trenches (gpd)	Date	Influent (gpd)	Effluent to Trenches (gpd)
8/13/2000	30,975	11,665	9/19/2000	44,298	21,733
8/14/2000	34,125	5,300	9/20/2000	33,563	16,116
8/15/2000	36,781	18,611	9/21/2000	35,147	15,686
8/16/2000	38,216	18,102	9/22/2000	33,768	19,053
8/17/2000	50,972	25,375	9/23/2000	22,486	5,546
8/18/2000	32,572	13,649	9/24/2000	17,020	4,306
8/19/2000	32,572	13,469	9/25/2000	19,737	5,021
8/20/2000	20,883	286	9/26/2000	41,294	23,087
8/21/2000	24,965	172	9/27/2000	44,999	26,234
8/22/2000	46,484	15,466	9/28/2000	37,817	25,538
8/23/2000	51,203	26,995	9/29/2000	35,446	18,522
8/24/2000	39,718	21,165	9/30/2000	23,174	5,015
8/25/2000	38,215	17,942	10/1/2000	22,390	3,785
8/26/2000	28,692	4,350	10/2/2000	25,620	1,783
8/27/2000	24,530	1,379	10/3/2000	34,541	14,972
8/28/2000	27,147	241	10/4/2000	34,037	15,446
8/29/2000	48,067	8,910	10/5/2000	32,456	17,593
8/30/2000	43,578	18,817	10/6/2000	26,816	15,303
8/31/2000	46,509	23,216	10/7/2000	16,789	4,033
9/1/2000	37,751	24,213	10/8/2000	16,789	4,033
9/2/2000	20,231	20,922	10/9/2000	21,833	3,456
9/3/2000	18,424	3,001	10/10/2000	36,772	20,879
9/4/2000	18,424	3,001	10/11/2000	39,845	37,683
9/5/2000	21,294	2,989	10/12/2000	34,885	39,374
9/6/2000	36,946	12,501	10/13/2000	34,940	18,862
9/7/2000	48,452	22,989	10/14/2000	38,617	8,081
9/8/2000	24,915	14,421	10/15/2000	28,624	13,229
9/9/2000	26,464	2,367	10/16/2000	18,404	5,672
9/10/2000	23,288	1,746	10/17/2000	37,481	21,082
9/11/2000	26,595	3,283	10/18/2000	37,860	20,229
9/12/2000	41,380	18,341	10/19/2000	35,476	22,193
9/13/2000	43,382	21,996	10/20/2000	34,380	18,528
9/14/2000	46,251	14,719	10/21/2000	19,255	7,181
9/15/2000	27,479	17,033	10/22/2000	20,646	3,674
9/16/2000	28,338	7,791	10/23/2000	22,844	3,676
9/17/2000	27,517	7,250	10/24/2000	36,764	21,340
9/18/2000	27,395	6,057	10/25/2000	38,269	19,954

Table C-1. (continued).

Date	Influent (gpd)	Effluent to Trenches (gpd)	Date	Influent (gpd)	Effluent to Trenches (gpd)
10/26/2000	39,312	22,969	10/29/2000	23,423	10,156
10/27/2000	30,740	20,505	10/30/2000	23,423	10,156
10/28/2000	20,878	8,523	10/31/2000	70,984	54,620

Appendix D

Test Area North/Technical Support Facility Sewage Treatment Plant Daily Influent and Effluent Flow Readings

Appendix D

Test Area North/Technical Support Facility Sewage Treatment Plant Daily Influent and Effluent Flow Readings

Table D-1. TAN/TSF STP daily influent and effluent flows.

Date	Influent (gpd)	Effluent (MU-015301) (gpd)	Date	Influent (gpd)	Effluent (MU-015301) (gpd)
11/1/1999	2,370	17,400	12/3/1999	6,800	23,750
11/2/1999	3,600	19,000	12/4/1999	6,800	23,750
11/3/1999	4,050	19,000	12/5/1999	6,800	23,750
11/4/1999	8,340	21,000	12/6/1999	6,800	23,750
11/5/1999	2,260	17,750	12/7/1999	9,870	27,000
11/6/1999	2,260	17,750	12/8/1999	7,250	24,000
11/7/1999	2,260	17,750	12/9/1999	9,450	27,000
11/8/1999	2,260	17,750	12/10/1999	2,020	23,200
11/9/1999	4,100	23,000	12/11/1999	2,020	23,200
11/10/1999	2,590	19,000	12/12/1999	2,020	23,200
11/11/1999	23,910	42,000	12/13/1999	2,020	23,200
11/12/1999	2,300	19,250	12/14/1999	2,020	23,200
11/13/1999	2,300	19,250	12/15/1999	8,190	23,000
11/14/1999	2,300	19,250	12/16/1999	9,330	24,000
11/15/1999	2,300	19,250	12/17/1999	6,600	23,000
11/16/1999	6,480	25,000	12/18/1999	6,600	23,000
11/17/1999	7,800	25,000	12/19/1999	6,600	23,000
11/18/1999	14,550	40,000	12/20/1999	6,600	23,000
11/19/1999	3,110	19,750	12/21/1999	31,920	50,000
11/20/1999	3,110	19,750	12/22/1999	23,400	40,000
11/21/1999	3,110	19,750	12/23/1999	31,620	38,000
11/22/1999	3,110	19,750	12/24/1999	5,560	21,000
11/23/1999	4,620	16,000	12/25/1999	5,560	21,000
11/24/1999	6,600	22,000	12/26/1999	5,560	21,000
11/25/1999	2,870	17,600	12/27/1999	5,560	21,000
11/26/1999	2,870	17,600	12/28/1999	5,560	21,000
11/27/1999	2,870	17,600	12/29/1999	5,560	21,000
11/28/1999	2,870	17,600	12/30/1999	5,560	21,000
11/29/1999	2,870	17,600	12/31/1999	5,560	21,000
11/30/1999	6,900	17,000	1/1/2000	5,560	21,000
12/1/1999	6,600	27,000	1/2/2000	5,560	21,000
12/2/1999	6,800	23,750	1/3/2000	5,560	21,000

Table D-1. (continued).

Date	Influent (gpd)	Effluent (MU-015301) (gpd)	Date	Influent (gpd)	Effluent (MU-015301) (gpd)
1/4/2000	11,880	24,000	2/10/2000	3,510	16,000
1/5/2000	8,430	24,000	2/11/2000	2,198	16,500
1/6/2000	9,630	23,000	2/12/2000	2,198	16,500
1/7/2000	773	23,250	2/13/2000	2,198	16,500
1/8/2000	770	23,250	2/14/2000	2,198	16,500
1/9/2000	770	23,250	2/15/2000	4,140	22,000
1/10/2000	770	23,250	2/16/2000	4,050	21,000
1/11/2000	8,400	25,000	2/17/2000	4,260	20,000
1/12/2000	8,520	23,000	2/18/2000	2,745	17,500
1/13/2000	8,460	22,000	2/19/2000	2,745	17,500
1/14/2000	6,230	21,750	2/20/2000	2,745	17,500
1/15/2000	6,230	21,750	2/21/2000	2,745	17,500
1/16/2000	6,230	21,750	2/22/2000	3,540	18,000
1/17/2000	6,230	21,750	2/23/2000	4,470	18,000
1/18/2000	6,540	23,000	2/24/2000	6,606	27,200
1/19/2000	8,440	23,000	2/25/2000	6,606	27,200
1/20/2000	8,440	22,000	2/26/2000	6,606	27,200
1/21/2000	6,750	21,000	2/27/2000	6,606	27,200
1/22/2000	6,750	21,000	2/28/2000	6,606	27,200
1/23/2000	6,750	21,000	2/29/2000	13,740	42,000
1/24/2000	6,750	21,000	3/1/2000	8,838	27,833
1/25/2000	6,870	23,000	3/2/2000	8,838	27,833
1/26/2000	6,810	34,000	3/3/2000	8,838	27,833
1/27/2000	7,780	21,000	3/4/2000	8,838	27,833
1/28/2000	5,150	19,000	3/5/2000	8,838	27,833
1/29/2000	5,150	19,000	3/6/2000	8,838	27,833
1/30/2000	5,150	19,000	3/7/2000	6,780	22,000
1/31/2000	5,150	19,000	3/8/2000	8,970	29,000
2/1/2000	7,740	22,000	3/9/2000	2,820	19,000
2/2/2000	5,980	19,000	3/10/2000	2,820	19,000
2/3/2000	6,300	20,000	3/11/2000	2,820	19,000
2/4/2000	4,700	20,250	3/12/2000	2,820	19,000
2/5/2000	4,700	20,250	3/13/2000	2,820	19,000
2/6/2000	4,700	20,250	3/14/2000	7,750	19,000
2/7/2000	4,700	20,250	3/15/2000	3,035	17,666
2/8/2000	5,490	20,000	3/16/2000	3,035	17,666
2/9/2000	4,530	21,000	3/17/2000	3,035	17,666

Table D-1. (continued).

Date	Influent (gpd)	Effluent (MU-015301) (gpd)	Date	Influent (gpd)	Effluent (MU-015301) (gpd)
3/18/2000	3,035	17,666	4/24/2000	2,408	24,000
3/19/2000	3,035	17,666	4/25/2000	5,310	28,000
3/20/2000	3,035	17,666	4/26/2000	5,550	26,000
3/21/2000	3,750	18,000	4/27/2000	5,100	27,000
3/22/2000	7,980	26,000	4/28/2000	2,685	20,500
3/23/2000	2,850	15,000	4/29/2000	2,685	20,500
3/24/2000	2,827	16,750	4/30/2000	2,685	20,500
3/25/2000	2,827	16,750	5/1/2000	2,685	20,500
3/26/2000	2,827	16,750	5/2/2000	6,900	26,000
3/27/2000	2,827	16,750	5/3/2000	7,020	26,000
3/28/2000	3,030	15,000	5/4/2000	4,860	16,000
3/29/2000	5,490	21,000	5/5/2000	2,243	18,750
3/30/2000	3,870	34,000	5/6/2000	2,243	18,750
3/31/2000	2,748	17,400	5/7/2000	2,243	18,750
4/1/2000	2,748	17,400	5/8/2000	2,243	18,750
4/2/2000	2,748	17,400	5/9/2000	7,860	30,000
4/3/2000	2,748	17,400	5/10/2000	11,220	23,000
4/4/2000	2,748	17,400	5/11/2000	4,680	25,000
4/5/2000	4,200	19,000	5/12/2000	3,060	34,250
4/6/2000	4,890	17,000	5/13/2000	3,060	34,250
4/7/2000	2,640	18,250	5/14/2000	3,060	34,250
4/8/2000	2,640	18,250	5/15/2000	3,060	34,250
4/9/2000	2,640	18,250	5/16/2000	5,520	31,000
4/10/2000	2,640	18,250	5/17/2000	4,560	25,000
4/11/2000	4,830	23,000	5/18/2000	4,050	27,000
4/12/2000	4,110	25,000	5/19/2000	2,745	25,750
4/13/2000	4,800	28,000	5/20/2000	2,745	25,750
4/14/2000	3,315	26,250	5/21/2000	2,745	25,750
4/15/2000	3,315	26,250	5/22/2000	2,745	25,750
4/16/2000	3,315	26,250	5/23/2000	6,420	28,000
4/17/2000	3,315	26,250	5/24/2000	10,500	31,000
4/18/2000	6,390	27,000	5/25/2000	3,005	27,167
4/19/2000	3,480	25,000	5/26/2000	3,005	27,167
4/20/2000	5,070	28,000	5/27/2000	3,005	27,167
4/21/2000	2,408	24,000	5/28/2000	3,005	27,167
4/22/2000	2,408	24,000	5/29/2000	3,005	27,167
4/23/2000	2,408	24,000	5/30/2000	3,005	27,167

Table D-1. (continued).

Date	Influent (gpd)	Effluent (MU-015301) (gpd)	Date	Influent (gpd)	Effluent (MU-015301) (gpd)
5/31/2000	7,860	31,000	7/7/2000	2,775	38,000
6/1/2000	2,772	25,200	7/8/2000	2,775	38,000
6/2/2000	2,772	25,200	7/9/2000	2,755	38,000
6/3/2000	2,772	25,200	7/10/2000	2,775	38,000
6/4/2000	2,772	25,200	7/11/2000	10,830	36,000
6/5/2000	2,772	25,200	7/12/2000	13,020	44,000
6/6/2000	10,141	33,000	7/13/2000	17,610	47,000
6/7/2000	18,900	46,000	7/14/2000	6,180	31,000
6/8/2000	11,010	35,000	7/15/2000	6,180	31,000
6/9/2000	3,127	25,750	7/16/2000	6,180	31,000
6/10/2000	3,127	25,750	7/17/2000	6,180	31,000
6/11/2000	3,127	25,750	7/18/2000	11,820	38,000
6/12/2000	3,127	25,750	7/19/2000	10,320	38,000
6/13/2000	4,170	31,000	7/20/2000	11,730	39,000
6/14/2000	7,230	28,000	7/21/2000	4,898	32,000
6/15/2000	10,770	34,000	7/22/2000	4,898	32,000
6/16/2000	4,875	27,750	7/23/2000	4,898	32,000
6/17/2000	4,875	27,750	7/24/2000	4,898	32,000
6/18/2000	4,875	27,750	7/25/2000	13,410	37,000
6/19/2000	4,875	27,550	7/26/2000	12,060	37,000
6/20/2000	4,260	22,000	7/27/2000	13,500	54,000
6/21/2000	8,460	32,000	7/28/2000	5,032	30,000
6/22/2000	18,240	41,000	7/29/2000	5,032	30,000
6/23/2000	4,755	26,000	7/30/2000	5,032	30,000
6/24/2000	4,755	26,000	7/31/2000	5,032	30,000
6/25/2000	4,755	26,000	8/1/2000	14,790	41,000
6/26/2000	4,755	26,000	8/2/2000	21,315	49,000
6/27/2000	15,300	49,000	8/3/2000	21,315	49,000
6/28/2000	12,330	37,000	8/4/2000	8,205	31,750
6/29/2000	13,680	37,000	8/5/2000	8,205	31,750
6/30/2000	4,170	18,500	8/6/2000	8,205	31,750
7/1/2000	4,170	18,500	8/7/2000	8,205	31,750
7/2/2000	4,170	18,500	8/8/2000	11,175	54,500
7/3/2000	4,170	18,500	8/9/2000	11,175	54,500
7/4/2000	4,290	31,000	8/10/2000	19,920	40,000
7/5/2000	4,290	31,000	8/11/2000	10,575	32,000
7/6/2000	15,930	47,000	8/12/2000	10,575	32,000

Table D-1. (continued).

Date	Influent (gpd)	Effluent (MU-015301) (gpd)	Date	Influent (gpd)	Effluent (MU-015301) (gpd)
8/13/2000	10,575	32,000	9/19/2000	11,460	32,000
8/14/2000	10,575	32,000	9/20/2000	11,370	32,000
8/15/2000	16,530	42,000	9/21/2000	6,390	27,000
8/16/2000	14,430	38,000	9/22/2000	3,308	26,250
8/17/2000	13,680	31,500	9/23/2000	3,308	26,250
8/18/2000	8,318	31,500	9/24/2000	3,308	26,250
8/19/2000	8,318	31,500	9/25/2000	3,308	26,250
8/20/2000	8,318	31,500	9/26/2000	5,250	30,000
8/21/2000	8,318	31,500	9/27/2000	4,890	22,000
8/22/2000	11,130	34,000	9/28/2000	7,530	28,000
8/23/2000	11,940	37,000	9/29/2000	3,330	23,750
8/24/2000	15,420	39,000	9/30/2000	3,330	23,750
8/25/2000	20,040	32,250	10/1/2000	3,330	23,750
8/26/2000	20,040	32,250	10/2/2000	3,330	23,750
8/27/2000	20,040	32,250	10/3/2000	24,300	48,000
8/28/2000	20,040	32,250	10/4/2000	28,590	26,000
8/29/2000	20,430	45,000	10/5/2000	3,570	24,000
8/30/2000	19,260	43,000	10/6/2000	2,730	22,000
8/31/2000	19,380	50,000	10/7/2000	2,730	22,000
9/1/2000	4,788	28,200	10/8/2000	2,730	22,000
9/2/2000	4,788	28,200	10/9/2000	2,730	22,000
9/3/2000	4,788	28,200	10/10/2000	5,880	28,500
9/4/2000	4,788	28,200	10/11/2000	5,880	28,500
9/5/2000	4,788	28,200	10/12/2000	3,420	22,000
9/6/2000	9,240	30,000	10/13/2000	4,148	30,250
9/7/2000	5,790	26,000	10/14/2000	4,148	30,250
9/8/2000	4,815	24,750	10/15/2000	4,148	30,250
9/9/2000	4,815	24,750	10/16/2000	4,148	30,250
9/10/2000	4,815	24,750	10/17/2000	3,720	26,000
9/11/2000	4,815	24,750	10/18/2000	3,900	25,000
9/12/2000	12,060	33,000	10/19/2000	4,320	26,000
9/13/2000	14,490	36,000	10/20/2000	2,175	26,250
9/14/2000	9,990	30,000	10/21/2000	2,175	26,250
9/15/2000	7,770	26,750	10/22/2000	2,175	26,250
9/16/2000	7,770	26,750	10/23/2000	2,175	26,250
9/17/2000	7,770	26,750	10/24/2000	3,900	27,000
9/18/2000	7,770	26,750	10/25/2000	4,380	29,000

Table D-1. (continued).

Date	Influent (gpd)	Effluent (MU-015301) (gpd)	Date	Influent (gpd)	Effluent (MU-015301) (gpd)
10/26/2000	4,020	27,000	10/29/2000	2,498	26,250
10/27/2000	2,498	26,250	10/30/2000	2,498	26,250
10/28/2000	2,498	26,250	10/31/2000	6,540	30,000